

FLIGHT

First Aero Weekly in the World.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

OFFICIAL ORGAN OF THE ROYAL AERO CLUB OF THE UNITED KINGDOM.

No. 166. (No. 9, Vol. IV.)

MARCH 2, 1912.

[Registered at the G.P.O.]
as a Newspaper.

[Weekly. Price 1d.
Post Free, 1½d.]



Lieut. Dahlbeck, of the Royal Swedish Navy, on his monoplane on the ice at Stockholm.—Lieut. Dahlbeck has been doing some good work in starting and landing on the ice with and without passengers. Lieut. Dahlbeck, it will be remembered, graduated in flying at the Grahame-White School at Hendon.

EDITORIAL COMMENT.

**Better Late
than
Never.**

At last Great Britain is to commence coming into line with the Great Powers of the Continent by the establishment of a military air corps worthy of her rank among the nations. It has taken a great deal of time and more agitation to bring home to the authorities the realisation that in the aeroplane we have an engine of war which may well decide the fate of battles and, collaterally, that of nations, but this we have to be thankful for, that now the start has been made it is with no ungenerous hand that the Government is approaching the problems of the air. The vote for which Lord Haldane is asking may not be as large as that placed on the French estimates for the current year, but there is at least some reason to think that the £308,000 which is being allotted now is only an earnest of more to come. Even taken by itself it is, as we say, not an ungenerous amount, and we welcome it the more as evidence that the Government no longer intends this country to lag behind its rivals in the lamentable fashion which has given us so much concern in the past. Moreover, the fact must not be lost to sight, the sum quoted is for the Army alone—it takes no account of any sums that may be asked for in the forthcoming Naval Estimates and, if we are not very much mistaken, the appropriation that will figure in those estimates for the creation of an efficient aerial service for the Navy will be a fairly substantial one. For this relief, much thanks.

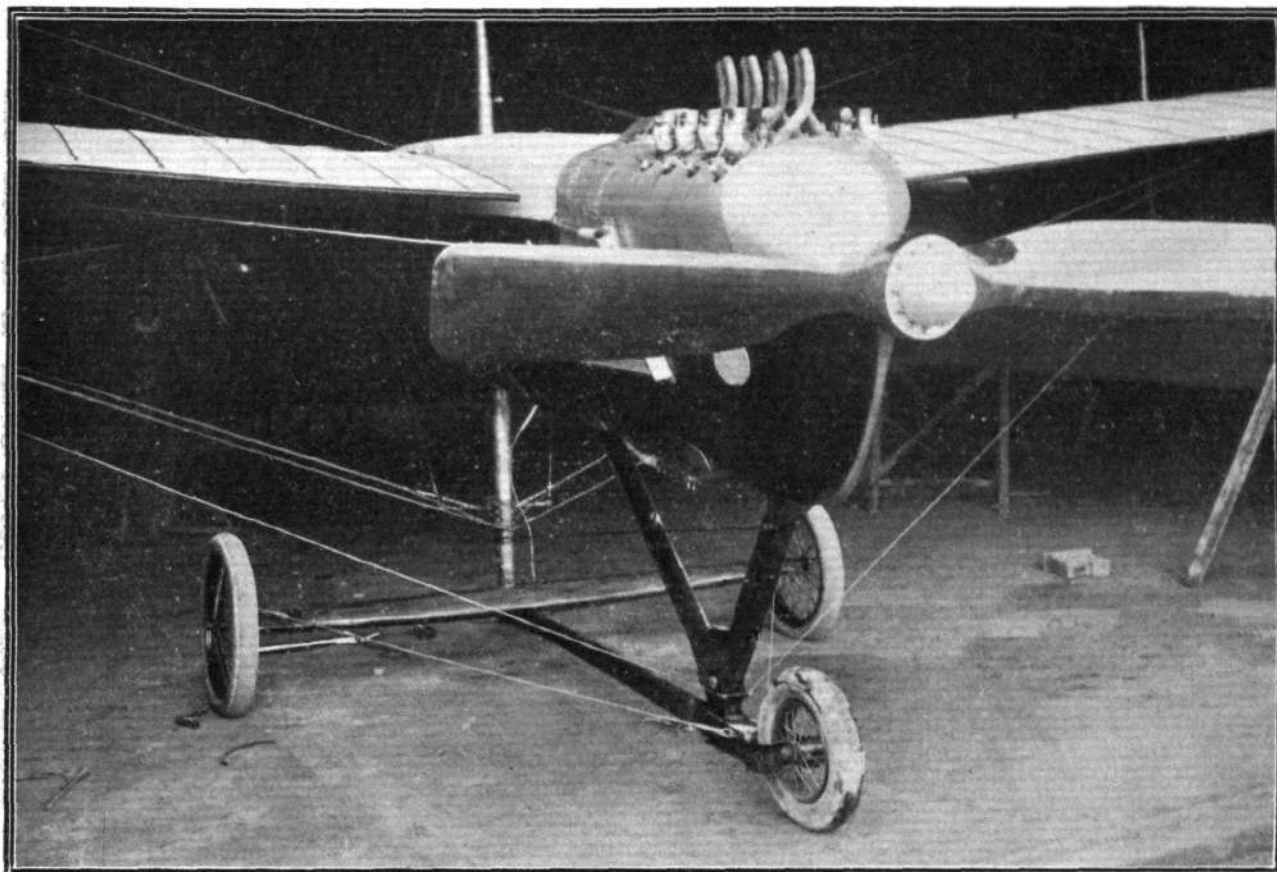
Naturally, the first feeling induced by the awakening of the Government to the enormous potentialities of aircraft is one of intense satisfaction. Criticism is well-nigh disarmed by the figures as they stand, especially when we keep it in mind that there must necessarily be a Naval vote in addition. Therefore, any comment that is to be made on the Estimate must be in the nature of discussion and suggestion, which shall be constructive rather than critical. There are several points, too, which may be usefully discussed ahead of the announcement of precisely how the vote is to be spent—for we take it for granted that Parliament will not revise the suggested expenditure in the direction of a cutting down, which would be the falsest of false economy. To begin with, it is to be sincerely hoped that the British industry, upon which the country must ultimately depend for the supply of *matériel*, will be systematically fostered, not only to the end we have indicated, but in order that it may be enabled to secure its legitimate share of the world's trade in air-craft. Let us not be taken to mean that the figuratively blind and halt should be nursed into a fictitious semblance of health, for that way lies the inefficiency which we cannot afford at any price. We have a parallel in the shipbuilding industry. Great Britain practically builds the warships of the world, but she would never have attained to the proud position she holds had it not been for the judicious policy of the Government towards the industry. During the Napoleonic wars, and for years after, the French naval architects were far ahead of our own in design, and, logically, it would seem that if we had desired the best that could be obtained for our own Navy, we should, after the wars, have gone to France for our ships. But nothing of the sort happened. Our own people were sympathetically encouraged until, as is our wont, we before long took the lead and now the art of warship building is understood nowhere so well as it is in

our own yards. To-day we are in the same position so far as regards the aeroplanes as we were during the first three decades of last century in relation to warship construction. It would be idle to deny that France leads us in the aeroplane industry, though we have come along very rapidly of late and possess more than one factory which is capable of turning out air-craft quite fit to lie in the line with the best produced across the Channel. But one swallow does not make a summer, and neither does a single firm, or even half a dozen, make an industry. The salient fact is, however, that we can and do build aeroplanes in this country which are as good as any, so that all that is required is reasonably sympathetic fostering to create from the existing nucleus an industry worthy of the country and efficient against the time of stress.

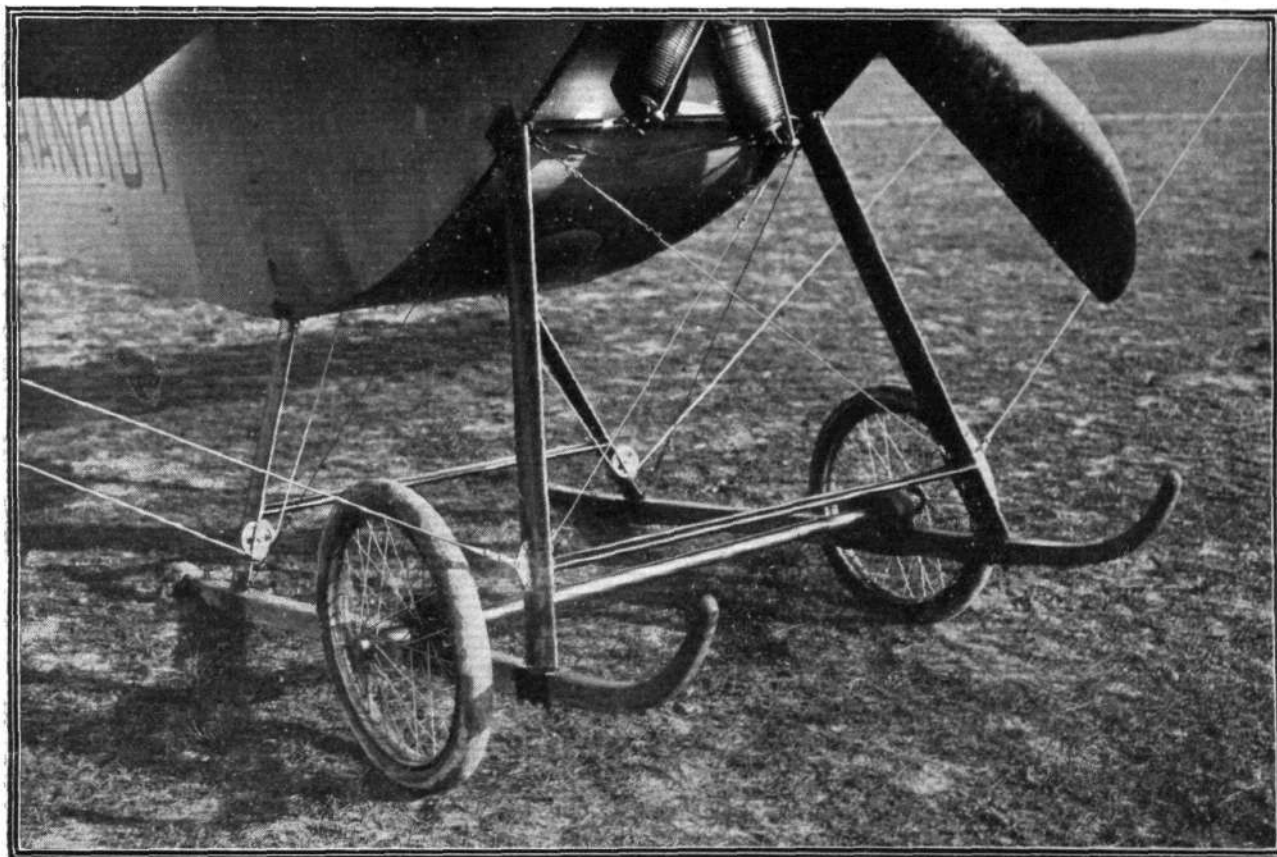
We have emphasised this need for building up the industry as rapidly as possible because we have something of a lurking fear—it has been made the subject of categorical statement in some quarters—that when we set to work on the building of aeroplanes for the Army it will be found that arrangements have quietly been made to manufacture on a large scale at the Army Aircraft Factory. It is not that we, on behalf of private industry, are afraid that money will go in a direction we had rather not see it take, but we are most absolutely convinced that the road to safety lies through a strong industry in private hands rather than through practical concentration in a Government factory. Indeed, this is so obvious as to need no explanation. We have got to dig much deeper than merely experimental work in an official laboratory will take us. We have not got the perfect aeroplane motor yet—which means that it must be made worth while for the best engineering brains at our disposal to investigate the problems connected with flight engines. There are many other directions in which judicious encouragement will be necessary to create and preserve the organisation that will be required to place us on an equality with the Continental Powers, but there is no necessity at the moment to go farther on this point than we have already done.

There are two points in the Estimate upon which we trust some discussion will centre when the Estimates come to be debated in the House. First of all, there is to be built and equipped a school of flying, but there is nothing said about any provision for taking advantage of the organisation and experience of existing privately-owned schools. This seems to us to be a mistake, for if we are going to build two hundred or so aeroplanes we shall necessarily require the men to fly them, plus a proportion to fill the gaps caused by casualties. It is manifestly impossible that this number can be trained in a school which, at the moment, exists only on paper, and the efficient military aviator is not made in a day either. Surely it is possible for some arrangement to be made whereby the services of the schools can be secured if and when they may be necessary, as necessary they undoubtedly will be.

Finally, we would express the pious hope that the appropriation of £161,000 which figures under the head of "Aeroplanes, Materials, &c.," will not be subjected to depredations on behalf of futile experiments with dirigibles, large or small. Let these have their own grant—and justify it.



In their new military monoplane, "La Triplette," the Antoinette firm have made use of an altogether new form of landing chassis. The motor, an 8-cyl. Antoinette of 60-h.p., is covered by a shield, as on the Martin-Handasyde monoplane, to reduce head resistance.



The landing chassis of the Hanriot-Pagny monoplane is modelled on pronounced Nieuport lines. The skids project backwards, Bristol fashion, so that, on depressing the tail, they rub along the ground, and so bring the machine to a standstill after a minimum of run.

THE SERVICE GRANT FOR AVIATION.

LORD HALDANE'S announcement, in his memorandum issued with the Army Estimates on Tuesday night, in regard to the increased provision for the "Fourth Arm" has been favourably received; and although the sum asked for is very inadequate as compared with the sums devoted to this side of military requirements by other countries, the amount must be regarded as a generous start under the apathetic conditions hitherto obtaining in this country in connection with aviation. And it is noteworthy that this increased amount accounts for the total increase in the full Estimates for the year. Lord Haldane, in dealing with this part of his figures says:—

"Sufficient experience has now been gained in military aviation to warrant advance on less tentative lines; and after careful consideration by the Committee of Imperial Defence, it has been decided to establish at once a joint Army and Navy School of Aviation, at which officers of both services shall be taught to fly, before proceeding to the separate Army and Navy establishments at which they will be exercised in the more specialised requirements of their respective services.

"A site for the school has been selected on Salisbury Plain, and the purchase of the necessary land will be completed at the beginning of April. Building, to plans which have been already prepared, will be pressed forward rapidly, and it is hoped at a very early date to have accommodation at the school for officers and men, instructors and mechanics, as well as the necessary sheds for aeroplanes and workshops for their repairs and adjustment. Provision has also been made on an extended scale for purchase of aeroplanes and other necessary equipment for the school.

"Officers of both Services will be employed on the staff of the

school, and its expenses (other than cost of land) will be shared between Army and Navy votes.

"The Estimates further provide for continuing the experimental and other work of the Army Aircraft Factory, for further buildings required for airships, for an addition of personnel to Army establishments for aeroplane work, and for a considerable number of aeroplanes as a first instalment of the equipment of the Field Army.

"The total provision for the above services made in these Estimates compares with that made in 1911-12, as follows:—

	1912-13.	1911-12.
Establishment of Army personnel for aeronautical work	£ 25,000	£ 20,000
Premiums to officers gaining pilots' certificates	3,000	—
Staff of new school	5,000	—
Aeroplanes, stores, and materials for factory and school	161,000	85,000
Buildings, including Army share of school buildings	38,000	26,000
Land for school	90,000	—
	<hr/> 322,000	<hr/> 131,000
Less Admiralty contribution to general expenses of school	14,000	—
	<hr/> 308,000	<hr/> 131,000
Increased provision	£177,000 "	

Last Year's Work.

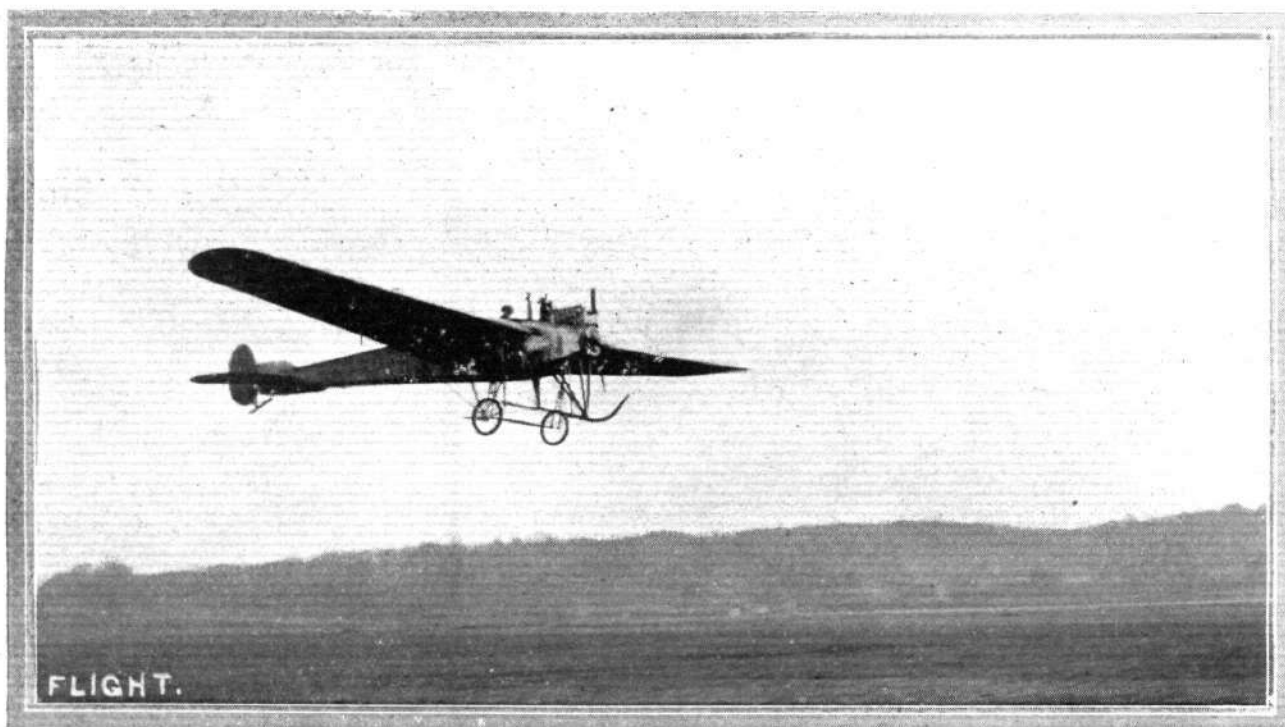
IN connection with the developments in Army aviation, foreshadowed by the Army Estimates, the following excerpt from the report of the Comptroller and Auditor-General on the Army Appropriation Account for 1910-11, dealing with the Aircraft Factory, makes interesting reading:—

"The value of the articles manufactured and services performed, including semi-manufacture, shows a considerable increase upon 1909-10, being £24,087, as compared with £13,573 in the previous year, while the stores in stock stood at £12,092 on March 31st, as compared with £4,945 at the corresponding date in 1910. The variation in price in certain cases is being inquired into by the War Office. The rate of general indirect expenditure was 153·6 per cent., as compared with 165·94 per cent. in 1909-10. The accounts submitted by the Superintendent of the Aircraft Factories show that

£15,109 was spent in wages, £19,501 in materials, and £15,104 in buildings at the factory, which, with other items, makes the amount spent during the year £61,636. In a statement relating to the production of the factory (stock is estimated at a value of £16,352) there appears the sum of £4,145 for alterations, repairs, and maintenance of dirigibles and aeroplanes, while experiments cost £2,480, and repairs and maintenance of spherical balloons, kites, &c., £1,400."

Col. Seely, M.P., already Inspecting Aeroplanes.

OUT of evil cometh good—occasionally, and thereby it transpired last Saturday, following a motor accident, that Col. Seely, the Under Secretary for War, had been inspecting aeroplanes. That was the statement the gallant Colonel made in the evening at a prize distribution at Chelsea, in explaining that he was fortunate in being able to be present at the function.



The Green-engined Flanders monoplane getting off smartly with a passenger at Brooklands.

AUTOMATIC STABILITY.

By J. C. S.

LOOKING back over the list of fatalities that have occurred since the inception of the heavier-than-air machine, one cannot help being struck with the number that have been attributable to inexperience, false manoeuvres on the part of the pilots, equilibrium lost through severe wind gusts, steep *vols piqués*, and falls occasioned by motor stoppage. These accidents, and they still, unfortunately, continue to occur, indicate in a most striking manner the lack of consideration that has been given on the part of designers to that function of the most primary importance—the stability of the aeroplane.

Take, for example, the contests of this closing year; in almost every case the prizes have been awarded to the competitor that could show the greatest speed, the greatest ability at finding his way across country, and the one who could exhibit the greatest hardihood and ability in fighting against adverse conditions. In this quest for speed, itself an important feature in the light of future requirements, and one which has a direct bearing on stability, there is little doubt that the consideration of keeping the aeroplane on an even keel, in both a lateral and a longitudinal sense, has been left too much to the care of the pilot.

As a means of defence in war, and as a sporting pastime, the success of the aeroplane is at present assured; but can it be expected that the industry will be content to exist on the business it does with the War Office, the Admiralty, and those representatives of the monied section of the community who can afford to indulge in aeroplaning as a sport? It is scarcely likely. It is on the success of the aeroplane as a commercial or a pleasure vehicle that the larger success of the industry depends, and it is difficult to see how this can be attained while such acrobatical movements on the part of the pilot at the expense of so much physical exertion are required to maintain an even balance in a wind. Again, in the development of the aeroplane as a commercial vehicle, such engine powers and such large supporting surfaces are likely to be obtained that means of maintaining balance other than by utilising the ever-variable human factor will have to be devised.

It may be argued that lack of stability has not in any way interfered with the success of the bicycle, and that intelligent control has all along superseded any attempt at furnishing it with a modicum of stability by the addition of a third wheel. This, in our opinion, is scarcely a fair example to cite, for the rider has only to give his attention to balancing in a lateral sense—his longitudinal stability is already assured—while, at high speeds, he is given a great deal of assistance in the former respect by the gyroscopic action of the wheels. Again, in comparison with the aeroplane, the consideration that he would not have so far to fall in the event of his equilibrium being destroyed is one that perhaps has an important bearing on the subject.

In the case of the aeroplane, stability has to be maintained in every direction. A disturbing gust may have the effect of tilting the tail, of tilting the head, or of rocking the machine about its longitudinal axis. In the first two cases it is the longitudinal equilibrium that is at fault, and in the latter case its natural lateral equilibrium is weak.

If the aeroplane becomes tilted in any other direction it involves both longitudinal and lateral stability and in this case both are at fault.

The means of securing stability, *i.e.*, maintaining equilibrium in aeroplanes other than by manual control fall under two classifications:—

1. Those in which stability is *natural*, being inherent in the design by virtue of the shape of the wings or because of some other peculiarity of form.

2. Those in which stability is *automatic*, being obtained by the use of some purely mechanical device, which may be considered as a "brain equivalent."

Much space has already been devoted to the subject of natural stability, and as, perhaps, the latter method of obtaining stability has not enjoyed so much elaboration, and in view of the renewed interest aroused by the rumour that the Wright Bros. intend to carry out further experiments in automatic stability devices, the writer intends to briefly review some of the ideas that have from time to time been put forward under this head.

Let us first consider those devices that ensure stability in a longitudinal direction.

These automatic stabilizers can be classified into four divisions according to which of the following principles their operation applies:—

1. Gyroscopic action.
2. Pendulum action.
3. Velocity pressure action.
4. A combination of velocity pressure and inertia actions.

Some diversity of opinion appears to exist as to the values of the gyroscopic and pendulum systems as compared with those that employ the velocity pressure or inertia principles. It has been maintained by some authorities that while the former two systems of correcting longitudinal balance do not come into action until the attitude of the machine has already been changed by the effect of the disturbing gust, the latter two systems act before any alteration in the attitude of the machine is apparent, in that they are brought into operation at the same moment and by the same force that tends to upset the balance.

The essential difference between the action of the two pairs of systems is that the gyroscope and pendulum devices are continually restoring the machine to an even keel by a direct method, while those stabilizers operating on the pressure vane or a combination of the velocity pressure and inertia principles maintain longitudinal stability by the indirect method of regulating the speed of the machine.

1. **Gyroscopic Devices.**—Although most people are familiar with the gyroscope in the form of a rapidly revolving fly-wheel, which, mounted on a wire frame, amused us in our younger days by its marvellous powers of balancing itself on the edge of a tumbler or on a piece of string stretched between two points, perhaps the property that enables it to so behave is not so well-known. When a wheel, in which as much of its weight as possible is disposed at its rim, is spun rapidly, its spindle exhibits a strong tendency to remain pointing in the same direction as that in which it reposed when the initial spin was given. Further, the strength of this tendency increases in a certain relation to the weight, the diameter, and the speed of the gyroscope.

Thus it can be seen that a gyroscope of sufficient size, and revolving at a sufficient speed, could be so mounted in an aeroplane as to keep it in an even keel by sheer brute force. However, such a suggestion, while it has with more or less success been applied to sea-going vessels, is impossible of application in the case of aeroplanes, owing to the excessive weight of a gyroscope necessary to fulfil this condition, and the excessive power that would be needed to drive it. Again, viewed in the light of the strength of present-day aeroplanes, it would be difficult to produce a machine that would withstand the heavy strains thrown upon it by a powerful gyroscope so mounted.

Several suggestions have been put forward in which the combination of the gyroscope and pendulum is made use of, an arrangement which allows of a much smaller gyroscope being used. A pendulum, in which the bob is replaced by a gyroscope, is, theoretically, a dead-beat one, but in practice it has not quite lived up to its expected reputation on account of the mechanical frictional resistance opposed to its free movement. In a system of this description the elevator would be operated indirectly by the gyroscope-pendulum through the medium of some form of relay.

As there is no relay whose action is absolutely frictionless it can be seen that a considerable and continual resistance will be offered to the free movement of the pendulum by the relay, and this feature will have the effect of altering the direction of the gyroscope spindle by degrees until it eventually assumes a position in which no effect will be produced on it by any longitudinal oscillation on the part of the machine. In this position the gyroscope will naturally be useless as a means of preserving equilibrium in a fore and aft direction.

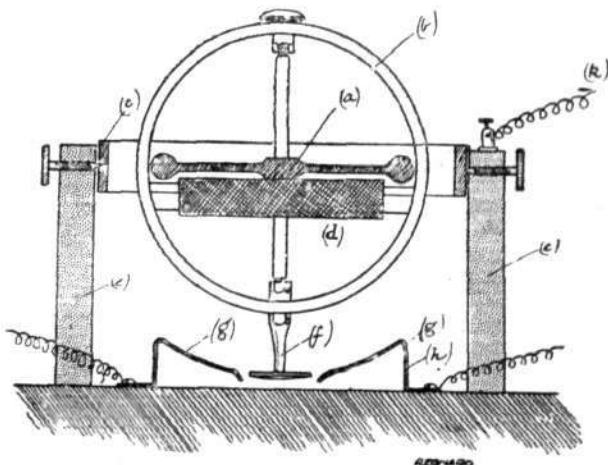


Fig. 1.—The gyroscopic stabilizing device conceived by M. Paul Regnard.

For the maintenance of *course*, which is a form of stability—directional stability—the gyroscope has been made use of in the Whitehead torpedo, and in this instance it has proved successful because the “flight” of a torpedo only occupies a period of a few minutes and during this time no serious alteration in the direction of the spindle of the gyroscope is likely to occur.

The gyroscopic stabilizing instrument (Fig. 1), which M. Paul Regnard exhibited in 1910 at the Physics Exhibition of the French Society for the encouragement of National Industry, has many points to commend it. It consists of a gyroscope (a) set in gimbals (b) and (c) in order that it can maintain its initial direction independent of any movement that the machine may make. The gyroscope (a) is kept in rotation by means of an electric motor (d), the armature of which is concentric and rotates with the spindle of the former. To the baseboard of the instrument are attached, in addition to the standards (e) supporting the gimbals, the brushes (g) and (h), which are electrically connected to a suitable solenoid or system of solenoids. Its action can be readily seen. If the machine were travelling in the direction indicated and tended to dive, the relative disposition of the gyroscope and brushes (g) and (h), would alter, thus bringing the stud (f), which is directly attached to the inner gimbal (b), in connection with the brush (g). The electric current entering the gyroscope and gimbal system by the connection (k) would thus be “distributed” to the brush (g), and led thence to a solenoid which would operate the elevator so that a horizontal flight path be regained.

To my humble way of thinking M. Regnard's system needs some modification to correct its two main shortcomings; firstly, that the spindle of the gyroscope would alter in direction by minute degrees in consequence of the resistance to free movement offered by the friction of the stud on the brushes; secondly, that no variable elevator control, according to the variable amount of tilt and dip, is provided for.

2. Pendulum Devices.—Various means have been brought forward to arrive at automatic stability, by making use of the function that the simple pendulum possesses of tending to maintain a vertical position. The chief drawback to this system is the fact that after once being deflected from its normal position, the pendulum does not return to it again until after it has described a series of oscillations. One experimenter in France, M. Moreau, however, has succeeded in obtaining a certain measure of success from

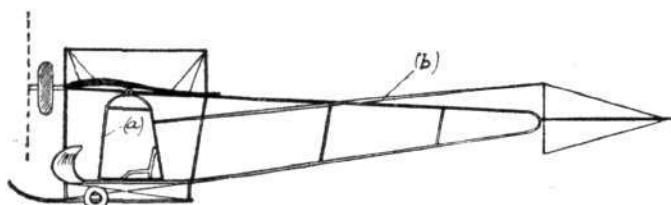


Fig. 2.—M. Moreau's pendulum-operated automatically-stable monoplane.

this scheme, and we produce herewith a diagrammatic sketch of the Moreau monoplane (Fig. 2). The pilot is seated in a kind of cage (a), which is suspended from the main framework of the machine, and any oscillation relative to the machine that it makes owing to the attitude of the aeroplane changing, is transmitted to an elevator arranged at the tail of the machine. In this manner the elevator is constantly being adjusted, so that the machine may always maintain a horizontal flight path.

Lateral stability is maintained in a similar manner by the connection of the ailerons to the sides of the pilot's nacelle. The striking success that M. Moreau has achieved with his system is demonstrated by the fact that just lately he, ascending alone, has been practising rifle shooting from his machine at a small target on the ground, and on one occasion of thirty shots, fired from a considerable distance, four found their mark. He is credited with scarcely ever flying with his hands on the controls.

That he should have experienced no inconvenience from the oscillatory action of the pendulum is surely remarkable as this has for so long been considered the chief drawback of the pendulum idea.

Perhaps some explanation of his success is due to the fact that the pendulum as Moreau employs it, would, to a certain extent, be rendered dead beat, by reason of the damping action of the elevator to which it is connected.

The mercury bath or curved tube idea (Fig. 3) is essentially another form of the pendulum system. The latter of these two ideas would, no doubt, in practice exhibit superiority above the former method, on the score that it would be more dead beat. Into a curved glass tube (a), filled with some viscous non-conducting fluid, is introduced a globule of mercury (b), which, despite any inclination of the tube, is in constant contact with a platinum wire (c) supported along the middle of the tube. Arranged

along the base of the tube are a series of platinum studs, each one connected to an exterior wire. In the action of the device the mercury globule acts as a distributor, leading the current entering by the wire (c) or to the several studs, according to the varying inclination of the tube from the horizontal. The studs are connected with some form of solenoid or electro-magnet in such a manner that contact of the mercury globule with these studs at the

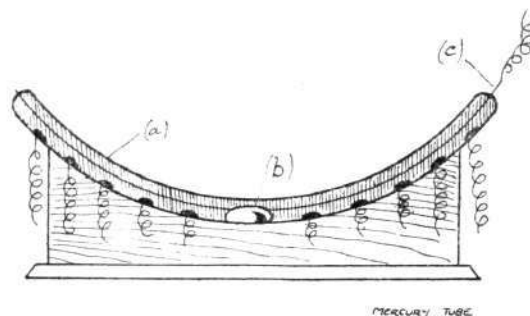


Fig. 3.—The curved mercury tube system of automatically maintaining stability.

extremities of the tube produces a greater pull on the core of the solenoid, and consequently a greater amount of deflection of the correcting rudder than with those situated near the centre. An important point to remember in connection with this is that the solenoids or electro-magnets should be so devised as to give various pulls on the controlling rudder, which should progress in intensity as the tube becomes inclined, and as the globule travels along the series of studs. This point has considerable bearing on the subject of the construction of relays suitable for application to devices for the maintenance of longitudinal stability, for as soon as the elevator has been adjusted to correct any longitudinal oscillation, the power operating the elevator should be shut off progressively at the same rate as the aeroplane returns to its normal state of equilibrium.

3. Velocity Pressure Devices.—The Wright Brothers, even though they were strongly of the opinion that there was no more need for an automatic stability device on an aeroplane than there would be on a bicycle, must certainly have been awake to the possible requirements of the future, for in 1909 they took out a patent covering the means whereby they could render their flyer automatically stable. Some time since, vague rumours reached us from America that the famous pioneers had commenced practical experiments with a glider equipped with their automatic stability system, but no truth need be attached to these reports. However, the fact that they have a glider already fitted with the device is sufficient evidence that they intend to commence experimenting upon it at the first possible opportunity.

A full description of the Wright system appeared in FLIGHT of July 10th, 1909, but for the benefit of those who have not this copy in their possession, a brief description is appended.

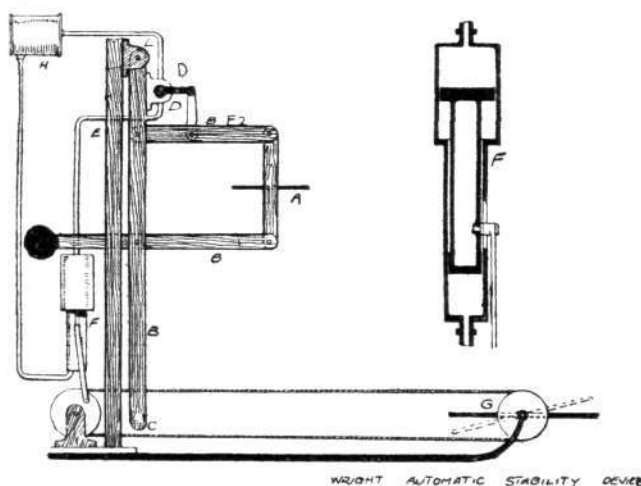


Fig. 4.—Diagrammatic sketch of the Wright stabilizer.

A flat vane, A (Fig. 4), is mounted on a parallel motion framework, B, which is suspended from a pivot, L, solid with the body of the aeroplane, and which is counterbalanced by the weight, K, in such a manner that the vane, A, is constantly maintained in a horizontal plane relative to earth. Let us suppose the head of the machine were to dip.

The vane, A, therefore, would become positively incident to the relative wind and would consequently lift, deforming the framework, B, and operating the three-way valve, D. This valve controls the admission and escape of compressed air to and from the relay motor, F, which is represented in section by the inset sketch. The result of the particular valve movement that the lifting of the vane, A, would make, would be to return the piston of the motor, F, to the top of its stroke, thus arranging the elevator, G, connected by rope and pulleys to the motor, in the position for ascent. If the head were to tilt, the relative wind would blow on the top of the vane and the action of the pneumatic relay would be to set the elevator for descent. A very ingenious device was that suggested by M. Orlando, of Rome (Fig. 5), but although at first sight it appears so evidently simple and convenient on the score that it is entirely automatic and does away with the extra complication of a relay mechanism, it is doubtful if the system would give good results when put to practical

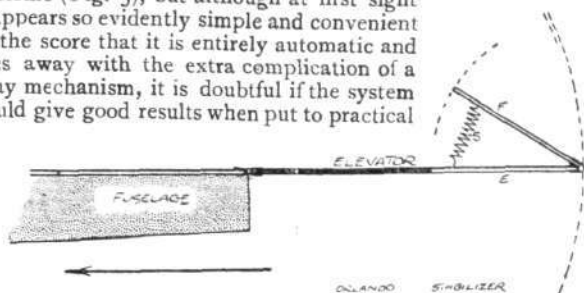


Fig. 5.—The Orlando anemometric stabilizer.

test. At the end of the extension, E, of the elevator is hinged a flap, F, which is retained in position by the spring, S. Should the aeroplane to which this apparatus is fitted tend to dive, the relative wind will increase in velocity with the result that the incidence of the flap, F, will tend to increase, thus raising the rear of the elevator, and arranging it in the position for ascent.

Should, on the contrary, the head be inclined to rise, the relative speed will drop, and the strength of the spring, S, will overcome the lift on the flap, F, and the elevator will thus be thrown into a position for descent. The system is based on the state of equilibrium between the positive and negative lifts produced by the relative wind in the rear elevator and on the hinged flap.

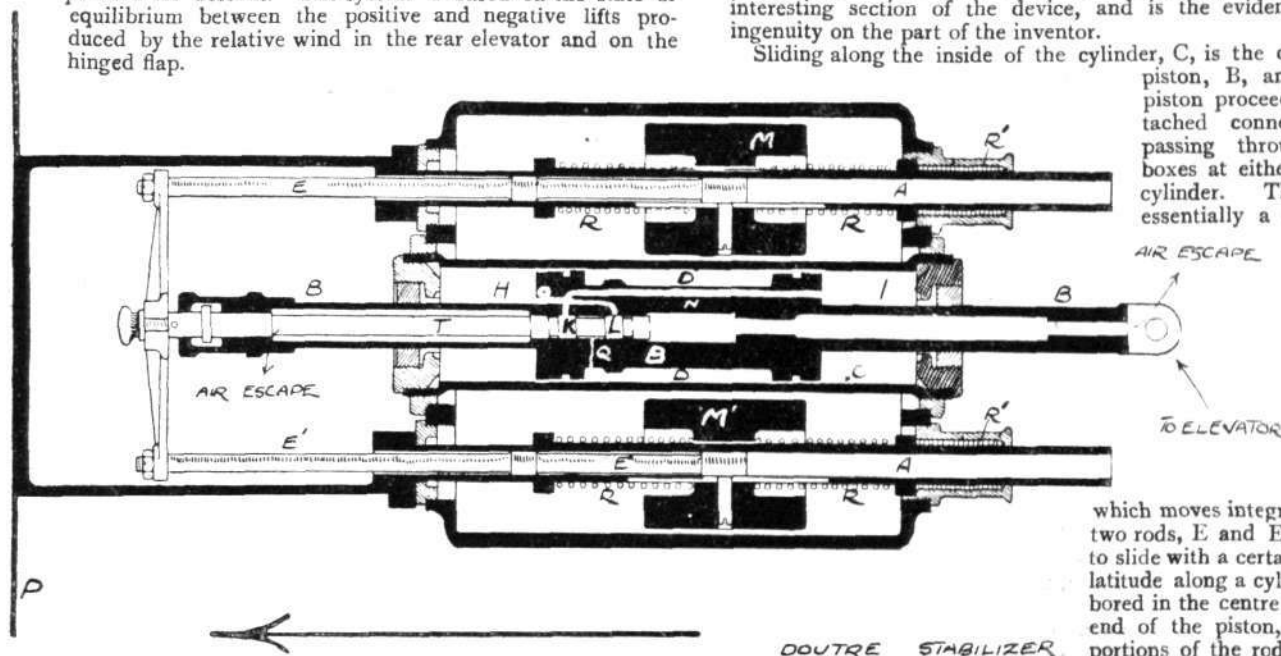


Fig. 6.—The Doutre automatic stabilizer.

4. Devices Depending on both Velocity Pressure and Inertia Principles for their Action.—Undoubtedly the most noteworthy device for maintaining longitudinal stability, combining both velocity-pressure and inertia actions, is the Doutre stabilizer, for not only is its operation sound on theoretical grounds, but it has fully demonstrated its practical value as applied to a Maurice Farman biplane, piloted by Didier. Some photographs of this device appeared in FLIGHT some months ago, but as the description accompanying them was necessarily short, in view of the information available at the time, it may be of some interest to describe the device at fuller length.

Fig. 6 represents a section of the apparatus. It has three essential members, an anemometer, represented by the pressure-vane, P, an accelerometer, represented by the movable weights, M and M', and a relay device which, by means of compressed air,

operates the longitudinal rudder according to the indications of the former two members.

The pressure-vane, P, is mounted on arms proceeding from the tubes, A, which are free to slide in a longitudinal direction through bearings in the aluminium casting that forms the outside of the instrument. When the relative speed of the machine is equal to or greater than its flying speed the pressure-vane is forced back against a stop, but as soon as the relative speed drops below the flying speed, the springs, R', come into action, and press the tubes, A, together with the vane, forward. By their connection with the rods, E, they withdraw the slide-valve rod, T, so that the pneumatic relay immediately sets the elevator for descent. The action of the relay mechanism will be explained later. As the speed of the machine increases towards that necessary to sustain the aeroplane, the vane will gradually recede until it returns to its normal position, by which time the elevator will have gradually moved from the descent position to the position of normal horizontal flight. Thus the function of the pressure vane, P, is to detect any diminution of speed below that necessary to sustain the aeroplane to which the apparatus is attached. Any increase of speed is detected by the movable weights, M and M', which are kept in position with regard to the rod, A, by means of springs, R, on each side, and which are keyed to the rods, E, by means of set screws. Should the front of the aeroplane tend to dip the speed will increase, and this will cause the weights, M and M', to lag behind, drawing with them the rods, E, and causing the slide-valve-rod, T, to operate the relay so that the elevator is arranged for ascent. As normal speed is regained, the springs, R, will return the temporarily-displaced weights, M and M', to their normal positions, and the elevator will, at the same rate, be brought back to its horizontal flying position.

The movable weights also assist the pressure-vane, P, in the detection of any decrease in speed.

Thus it will be seen that any deviation of the aeroplane from the horizontal path, an event which is accompanied by either a rise or a fall in the relative speed, will be detected by the combined action of the accelerometer and anemometer, and correcting adjustments of the elevator will simultaneously be effected by the relay mechanism. This latter itself is not by any means the least interesting section of the device, and is the evidence of much ingenuity on the part of the inventor.

Sliding along the inside of the cylinder, C, is the double-ended piston, B, and from this piston proceed rigidly attached connecting rods, passing through stuffing boxes at either end of the cylinder. The rod, T, essentially a slide valve,

which moves integrally with the two rods, E and E', is allowed to slide with a certain amount of latitude along a cylindrical hole bored in the centre of the front end of the piston, B. Those portions of the rod, T, marked K and L, are machined to be a perfect fit in the slide valve cylinder, while those portions

between and on each side of them are turned down so that there will be left an air space between the rod itself and the walls of this slide valve cylinder.

Compressed air is admitted to the compartment, D, and is carried thence by the duct, Q, to the air space between K and L. Let us imagine that the rod, T, is being withdrawn by the combined action of the plate, P, and the weights, M and M', in the event of a diminution of the relative speed of the machine. As the withdrawal takes place the movement of the piston, K, will uncover the end of the port, N, and admit air into the cylinder, I, with the result that the piston, B, will travel in the same direction as the rod, T, which movement automatically cuts off the supply of compressed air to the cylinder, I. At the same time the piston, L, will uncover the end of the port, O, and will release any compressed air that had previously been admitted to the cylinder, H. The compressed air

for the operation of the relay is supplied by a small compressor driven from the same motor that propels the aeroplane, and a reservoir of sufficient size is provided to furnish a further supply of compressed air should the motor cease performing its duty for any reason.

AIR EDDIES.

ALTHOUGH little has been heard during the last few weeks of the Avro hydro-aeroplane with which Commander Schwann has carried out experiments at Cavendish Dock, Barrow, operations in this direction are by no means at a standstill. Extensive repairs and alterations are being carried out under the direction of Sydney V. Sippe, who has temporarily taken up his abode at Barrow to superintend the *mise-au-point*. These should be completed in about another seven days and the experiments resumed.

Talking with Mr. R. Blackburn the other day, I learnt that, of the new Blackburn Military monoplanes now in the process of construction at his Leeds works, there is not a single component part that is not capable, under actual test, to withstand a stress of at least ten times that which it is likely to be called upon to bear under normal flying conditions. The Blackburn is still doing good work with Lieut. Spencer Grey at Eastchurch, and Lieut. Laurence at Shoreham. During last week the latter flew over to Eastbourne to pay a visit to Mr. F. B. Fowler, of the Eastbourne Aviation Co., completing a flight of 28 miles within the half hour, in spite of a head wind.

On Thursday last he had intentions of flying on to Dover, and it is more than likely that his projected Channel crossing may be a *fait accompli* by the time these lines appear in print.

Filey Bay should shortly see the trying out of a new hydro-aeroplane, with which the Blackburn Aeroplane Co. intend to experiment, in view of the increasing importance that is being attached to the production of a machine which will rise from and alight on water.

The offer that the British Deperdussin Syndicate are making just now should undoubtedly appeal to all those having intentions of qualifying themselves as exhibition flyers for the approaching season. To obtain a racing monoplane of the latest type, equipped with one of the new 35-h.p. Y Anzani motors, free tuition, and hangar accommodation for the machine, for an inclusive fee of £500, is surely a very favourable proposition.

Mr. Marcel Desoutter, who recently won his credentials at the Blériot School at Hendon, is, I believe, the youngest certificated aviator in the world, he attaining his eighteenth anniversary on the last day of January this year. He was ready for his tests before Christmas, but owing to the *brevet* age limit it was useless to complete them then. It is interesting to note that he was the third pupil to qualify at that school during that particular week, and the thirteenth to accomplish his tuition without being presented with a bill for damages.

As we imagined would occur as soon as we heard of Gordon Bell's engagement with the R.E.P. firm, that fine pilot has not been long in establishing for himself a fine reputation in France. Scarcely a day seems to pass but there are, in the French aviation press, paragraphs appreciative of his masterly handling of the R.E.P. monoplane. He has now obtained the two-seater monoplane with which he intends to fly from Buc to Bordeaux, with a passenger, as soon as the weather gets more settled. The machine is equipped with one of the new 7-cylinder radial 90-h.p. R.E.P. motors, and not long since, with a passenger on board, he took the machine up to 2,000 feet in 5½ minutes—not bad climbing.

Capt. E. B. Loraine of the Army Air Battalion at Salisbury is, I believe, the most versatile of our Service pilots. He obtained his ticket on a Valkyrie monoplane, and soon after, at the W. H. Ewen School, gained experience on both Blériot and Deperdussin monoplanes, the latter of which machines he handles particularly well. Since his appointment to Salisbury Plain he has done a good deal of flying on the 70-h.p. Gnome-Blériot and on the Bristol biplane.

The rumour current of late that a Russian chemist has succeeded in producing artificial rubber, and the importance that such a

The rod, B, is connected up to the elevator by a suitable system of levers. A force equal to the weight of 3 ounces is all that is necessary to move the rod, T, and this the pneumatic relay intensifies into a force equal to the weight of between 20 and 90 lbs., according to the pressure of the compressed air.

discovery would have in both the motor and the aviation world, brings to mind a few points in connection with the study of the production of synthetic rubber. It is not generally known that turpentine and rubber are of exactly the same chemical composition. Rubber is really turpentine in the colloidal condition, that is, it has a much larger number of atoms to the molecule than has turpentine. Para rubber, I believe, has about 2,000 times as many atoms to the molecule as turpentine, indeed, so large have been the molecules in some cases that scientists have actually claimed to have seen them.

A friend of mine, who has made a close study of the subject of colloidal condition for several years claims that he has obtained hydrogen in the colloidal form by the aggregation of its molecules under the influence of a static discharge of electricity. The importance of being able to obtain hydrogen in such a form that it will not pass through a porous membrane is readily evident in connection with the study of lighter-than-air craft, provided that the polymerising of the hydrogen atoms has little effect on the specific gravity of the gas.

Samples of rubbery substances, too, he has produced from turpentine, although the process is not the same as that employed for hydrogen. Naturally, for the present at least, he prefers to keep particulars of the process to himself.

Referring to my note a week or so ago on the dissatisfaction that was aroused in France by the suspicion that one of the aspirants for speed honours had "doped" his petrol with ether, it is rather interesting to find that one of the conditions of the forthcoming race, resulting from a challenge thrown out by Sommer to the Deperdussin firm, is that pure petrol should be used.

Those who have personal recollections of Lieut. O. Dahlbeck, of the Swedish Navy, while he was undergoing instruction at the Grahame-White school, will be interested to learn that he has lately been flying the Swedish naval two-seater Blériot-type monoplane at Stockholm, carrying out his experiments over ice, which, he says, makes the most excellent aerodrome imaginable, although the intense cold makes things none too pleasant at times. He has also been indulging in night flying. With the Bristol biplane he is shortly going to use he expects to get much better results, as his present machine is not a genuine Blériot. Both the Swedish passenger-carrying and duration records already stand to his credit, so, when he gets delivery of his new machine, there ought to be "somethin' doin'."

Messrs. Short Brothers, who have hitherto only been associated with machines of the biplane class, have constructed a monoplane which was tested for the first time on Saturday morning last, by Commander Samson. That it should fly satisfactorily at the first attempt and need no subsequent adjustments, is testimony enough of the remarkable excellence displayed by that firm in both design and construction. This new machine, which, superficially has much in common with the Blériot, we hope to describe fully next week.

M. Henri Salmel, or "Samlet" as he is affectionately known at Hendon, has succeeded in explaining away his descent in Regent's Park early on Sunday morning, and the Aero Club have accordingly exonerated him. It was his intention, on starting from Hendon, to repeat or improve upon that noteworthy flight of his former colleague, Pierre Prier, from London to Paris. Fog, however, was encountered somewhere in the Willesden district, and in trying to regain Hendon he lost his way. Nevertheless, he intends to start again at an early date and, if possible, to effect the return flight between the two capitals in one day.

I hear that Claude Grahame-White has signified his desire to uphold British prestige in the forthcoming Gordon-Bennett Cup Race in America. For this event he will, in all probability, fly a machine of his own construction, modelled on Nieuport lines, and equipped with the same 100-h.p. Gnome motor with which he lifted the trophy in 1910.

"OISEAU BLEU."

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

Annual General Meeting.

The Annual General Meeting of the Members of the Royal Aero Club of the United Kingdom will be held on Thursday, March 21st, 1912, at 4 o'clock, at 166, Piccadilly, London, W.

Notices of motion for the Annual General Meeting must be received by the Secretary not less than twenty-one days before the meeting, and must be signed by at least five members. Thursday, February 29th, 1912, was the last day for the receipt of notices of motion.

Committee.

In accordance with the rules, the Committee shall consist of eighteen members. Members are elected to serve for two years, half the Committee retiring annually. Retiring members are eligible for re-election.

The retiring members of the Committee are :—

Ernest C. Bucknall.	Sir Charles D. Rose, Bart., M.P.
Col. J. E. Capper, C.B., R.E.	A. Mortimer Singer.
G. B. Cockburn.	Hon. A. Stanley, M.P.
E. Manville.	R. W. Wallace, K.C.
J. T. C. Moore-Brabazon.	

Any two members of the Club can nominate a member to serve on the Committee, having previously obtained such member's consent. The name of such member so nominated, with the names of his proposer and seconder, must be sent to the Secretary in writing not less than fourteen days before the Annual General Meeting. Thursday, March 7th, is the last day for the receipt of nominations.

The following members have so far been nominated :—

* Ernest C. Bucknall.	Fred May.
* Col. J. E. Capper, C.B., R.E.	* J. T. C. Moore-Brabazon.
* G. B. Cockburn.	Norman Clark Neill.
Harry Delacombe.	* Sir Charles D. Rose, Bart., M.P.
Capt. J. D. B. Fulton, R.F.A.	* A. Mortimer Singer.
Major F. Lindsay Lloyd.	* Hon. A. Stanley, M.P.
* E. Manville.	* R. W. Wallace, K.C.

* The names marked with an asterisk are those of members of the present Committee.

Members are reminded that a ballot paper for the election of nine candidates to seats on the Committee of the Club will be forwarded to them at least seven days before the date of the Annual General Meeting.

Committee Meeting.

A meeting of the Committee was held on Tuesday, the 27th February, 1912, when there were present :—Mr. R. W. Wallace, K.C., in the Chair, Mr. Ernest C. Bucknall, Col. J. E. Capper, C.B., R.E., Mr. G. B. Cockburn, Col. H. C. L. Holden, C.B., R.A., F.R.S., Prof. A. K. Huntington, Mr. F. K. McClean, Mr. Mervyn O'Gorman, Mr. C. F. Pollock, and Harold E. Perrin, Secretary.

New Members.—The following new members were elected :—Lieut. D. G. Conner, R.F.A., and Comte James de Fitz-James.

Aviators' Certificates.—The following Aviators' Certificates were granted :—

186. Marcel Desoutter (Blériot monoplane, Hendon).
187. Lieut. Stephen Christopher Winfield-Smith (Bristol biplane, Brooklands).
188. Lieut. Cecil Thomas Carfrae, R.F.A. (Bristol biplane, Brooklands).

The request of the Aero Club of America to grant an Aviators' Certificate to Mr. William Hoff, was sanctioned.

Aeroplane Descent in Regent's Park.

Mr. Henry Salmest, who, on February 25th, 1912, made a flight over Hampstead and descended in Regent's Park, attended before the Committee. Mr. Salmest explained that, in his flight towards Croydon, he had no intention whatever of flying over London, which he had proposed to leave on his left hand. He further explained that he lost sight of the ground owing to the fog, and, eventually finding himself over houses, he made a descent at the first open space to ascertain his whereabouts, which turned out to be Regent's Park.

The Committee after consideration accepted this explanation, and considered that the circumstances of the case excused his actions.

Gordon-Bennett Aviation Cup.

With reference to the contest for the Gordon-Bennett Aviation Cup, which will take place in Chicago this year, the Wright Company, through the Aero Club of America, have given the following guarantee regarding aeroplanes taking part in the race :—

"In the interest of good sport, the Wright Company will permit representatives of foreign nations to participate in the 1912 race for the Gordon-Bennett Cup, regardless of any questions as to whether their aeroplanes do or do not infringe patents owned by this Company.

"The Wright Company will not bring suit against representatives of foreign clubs because of their participation in this contest for the Gordon-Bennett Cup.

"The Wright Company,
"WILBUR WRIGHT, President."

The Royal Aero Club last week cabled to the Aero Club of America, asking for an undertaking from the Wright Company to take no action whatever against British aviators or in respect of their aeroplanes for a period of three months from date of arrival, should they enter for the Gordon-Bennett Aviation Race. A reply has been received to the effect that the Wright Company will guarantee nothing beyond the assurance already given.

Mr. C. Grahame-White has intimated to the Club his desire to compete on behalf of this country, and a challenge has accordingly been transmitted to the Aero Club of America. The entries closed on March 1st, 1912.

Fédération Aéronautique Internationale.

A Conference of the Federation will be held in Paris on March 15th next, and the Royal Aero Club will be represented by Mr. R. W. Wallace, K.C., and Mr. Mervyn O'Gorman. At this Conference the rules of the Federation will be considered, as also the regulations for vertical speed records.

Competitions Committee.

During the last month the Competitions Committee has met each Tuesday evening at 8.30 p.m., at the Royal Automobile Club (by kind permission), to consider Competition Rules. These rules are nearing completion and will be published very shortly. On Tuesday last, Lieut. Gregory, R.N., attended the meeting and explained his views regarding the general navigation of aircraft. The following members have assisted on this Committee :—Col. H. C. L. Holden, C.B., R.A., F.R.S., F. K. McClean, Alec Ogilvie, Ernest C. Bucknall, Prof. A. K. Huntington, G. B. Cockburn, Mervyn O'Gorman, Major F. Lindsay Lloyd, and G. Brewer.

British Record for Duration with Passenger.

The Committee has accepted the following as a British record for duration with passenger :—

February 14th, 1912. Lieut. B. H. Barrington-Kennett, 4 hours 32 minutes.

The late Mr. D. Graham Gilmour.

The following letter has been received :—

"H.M. Submarine Depot,
"Fort Blockhouse,
"Gosport.

"DEAR SIR,—I write on behalf of the relatives of the late Douglas G. Gilmour to ask you to convey their very sincere appreciation to the Chairman and Members, Royal Aero Club, for their telegram and message of sympathy.

"I also wish to thank them for the beautiful wreath and other manifest expressions of sympathy at the funeral.

"Yours very sincerely,
(Signed) "LOUIS E. DARTNELL.

"The Secretary,
"Royal Aero Club."

Balloon Ascents.

Mr. G. P. Stollwerck, a member of the Royal Aero Club, competing in a long-distance balloon race at Cologne, on February 25th, 1912, was successful in obtaining first prize, with a distance of 100 miles. Seventeen balloons took part in the race.

166, Piccadilly. HAROLD E. PERRIN, Secretary.

ROYAL AERO CLUB FLYING GROUND, EASTCHURCH.

AT Eastchurch unfavourable weather conditions prevented any flying being done after 10 o'clock a.m. on Monday last week up to Tuesday night. Wednesday, however, brought a welcome change, which the various aviators took full advantage of. Lieut Longmore, R.N., decided that the time was opportune for an attempt on the Mortimer Singer prize for Naval Officers, and with the indomitable Lieut. Spencer Grey, R.N., as a passenger started out at 9 o'clock a.m. on the Short tractor biplane, which was carrying sufficient fuel for an eight hours' flight. Unfortunately, the best laid plans are always liable to be nullified by some trifling mishap, and after flying for exactly 100 miles in excellent time Lieut. Longmore was forced to descend owing to his engine suddenly misfiring badly. He was about one mile from the Eastchurch ground when this happened and about 1,000 feet up, but by clever judgment at the angle of descent he succeeded in making the aerodrome, and landed with his engine stopped, well within the boundaries. Five minutes later Grey was in the air again on his Blackburn monoplane, which he handles very nicely.

Thursday and Friday were not very suitable for flying although some practice was got during the early morning by the Naval and Territorial pupils.

Saturday was a very busy day, all the available machines being in constant use. Sergeant Cutler, of the Territorial Balloon Company, gained his pilot's certificate by a well-made flight during which he reached an elevation of some 300 feet. He was officially observed by Mr. Frank McClean, Lieut. L'Strange Malone, R.N., and Mr. J. L. Travers, the instructor. He is the first Territorial pupil to gain his certificate at the Eastchurch Aerodrome, but others are well on the way to doing so, and Sergeants Hedley, Hubbard and Meredith may shortly be expected to qualify for their "tickets." Lieut. V. A. Barrington-Kennett was down for the day and also flew for the last half of his pilot's certificate test on the Short dual-control biplane, completing the course in an excellent manner and landing very neatly.

Lieut. L'Strange Malone, R.N., who has been making straight flights for the last few days shows unusual skill for a beginner, his

flights being notable for steadiness and well-managed landings; given good weather he hopes to qualify for his certificate during the week.

Mr. Frank McClean, to whose generosity and energy the whole of the present forward state and activity at Eastchurch may be traced, visited the aerodrome on Saturday, and flew on the Short T 70-h.p. tractor biplane, which looked very fast when flying with the other machines.

Perhaps the most interesting flight of the day was that made by Commander Samson, R.N., who put the new Short monoplane through an official test, by making an hour's flight on same. The test was entirely successful; the new monoplane proving very fast and stable in the air. No adjustments were found to be necessary, although the machine was only turned out of the workshops on the previous day. Commander Samson, during this test, flew over Sheerness harbour, and his time in making this run and back to the ground, which is a good twelve miles, was found to be eleven minutes. Therefore, he averaged 65 miles per hour in spite of a fairly strong wind which was blowing at the altitude attained, viz: 1,400 feet. The monoplane is fitted with a 50-h.p. Gnome, which is overhung so that all parts of the engine are accessible.

On Saturday Jezzi put in a good deal of flying on his biplane, and made many circuits of the ground, the machine appearing to bank very well at the corners.

Ogilvie was also out on the N.E.C.-Engined Wright machine.

On Sunday Travers and the Territorials were out flying in a dead calm atmosphere, which prevailed between 7 and 10 o'clock a.m., Meredith making several very neat figures of eight. After this the wind began to get up and further flying for beginners was not considered advisable. About this time Ogilvie was flying the Wright biplane, which, in spite of the strong wind blowing, flew with great steadiness, after doing cross-country flying over the island. Ogilvie descended about noon. The wind must then have been blowing at 35 miles per hour above 100 feet.

In the afternoon the wind dropped to a calm; Jezzi had his small biplane out, on which he took up Mr. Cooper as a passenger.



IN MEMORIAM.

DOUGLAS GRAHAM GILMOUR. Died February 17th.

And those others who have lost their lives in furtherance of the Science of Aviation.

Relentless Nature, yielding grudging ground,
Claims toll as each fresh secret is unveiled;
Each guiding post, on man's path onward, found
Must mark the grave for one more life curtailed;
But more than title, more than name renowned,
Their one brief epitaph—"They have not failed!"

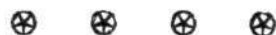
In every age, a small but gallant band
Has done the world's work, for a world still sleeping;
Treading where Fame and Death walk hand in hand,
Till mankind's praise blends with their near-ones' weeping.

They view, with fearless eyes, Time's lessening sand,
Nor count life without service worth the keeping.

Thus, by their sacrifice, we upward fling;
Challenge the eagle in his own domain;
Glide on the breeze, with ever-speeding wing,
Till air's last hidden mystery we attain.
Still, on the e'er-ascending scale of Life
Toward the Ultimate, goes on the quest;
The ordered plan evolves from Nature's strife
Whilst they, their earthly mission ended—rest.

February 24th, 1912.

DOUGLAS A. SMART.



French and German Aerial Fleets.

REPLYING to a question by Mr. Sandys in the House of Commons, on Tuesday, Col. Seely said France had 208 aeroplanes and 150 officers, while Germany had 30 aeroplanes and 85 officers. Col. Seely added that he hoped to make a general statement on aviation on the introduction of the Army Estimates.

Military Aviation in Germany.

THE sixty officers who are being trained at Johannisthal are rapidly qualifying for their certificates, and will shortly be transferred to Doeberitz to receive special instruction in military aviation. At the commencement of May a further batch of sixty officers will proceed to Johannisthal for instruction. The German War Office are placing orders for machines to keep these officers employed, the Rumpler firm having just delivered fifteen machines, while a similar number are to be delivered before the 15th of this month. It is expected that the German Army estimates will include a sum of about £100,000 for military aviation. Messrs. O. and C. Henckell, of Wiesbaden, have placed a sum of £5,000 at the Kaiser's disposal for the purchase of military aeroplanes. Aeroplane stations are to be formed at Metz, Cologne, and Strasburg, while a new military aviation camp is to be organised at Kummersdorf.

The National Movement in France.

HEADED by the gift of 100,000 francs from M. Michelin and of 50,000 each from *Le Matin*, *Le Journal*, *Le Petit Journal*, *Le Petit Parisien*, and the Paris Municipal Council, and 20,000 francs from the Rouen Municipal Council, the national subscription for purchasing aeroplanes for the French Army is rapidly mounting up so that at the beginning of the week it totalled very little short of 400,000 francs. All ranks of society are joining in the movement enthusiastically, and subscriptions are coming in from societies and institutions representing art, industry, and sport.

Belgium and the Gordon-Bennett Race.

THE Aero Club of Belgium decided, at a meeting on Tuesday last, to enter a team of three for the forthcoming Gordon-Bennett race in America.

More Competitors for Peugeot Prize.

TEN further entries were received during the week for the Peugeot prize—or Concours de l'Aviette, as it is called in France—for a human flight of 10 metres, and on Monday last the entrants numbered 91.

FROM THE BRITISH FLYING GROUNDS.

Barrhead Aerodrome (Scottish Aviation Co., Ltd.).

UNTIL Saturday of last week the wind and rain prevented the pupils from getting any practice, but on Saturday the climatic conditions were more favourable, and the pupils, Mrs. Lucking and Messrs. Walsh, Clinkskill and Burk, had the Caledonia monoplane out, and got in a good day's rolling practice. All the pupils show great improvement and aptitude in rolling and expect to start on the short flight stage next week. During the afternoon active instruction was given by Mr. Philpott for the benefit of the pupils.

Sunday saw Walsh out on the Caledonia, when he made some short flights for the first time. In the afternoon Philpott was out in a rather tricky wind to test the behaviour of the machine under adverse conditions, and it was found that the monoplane kept quite steady and needed very little attention to the controls. The chassis on this machine appears to be well suited for aerodrome work, and although some exceedingly rough landings have been made, not even a wire was broken.

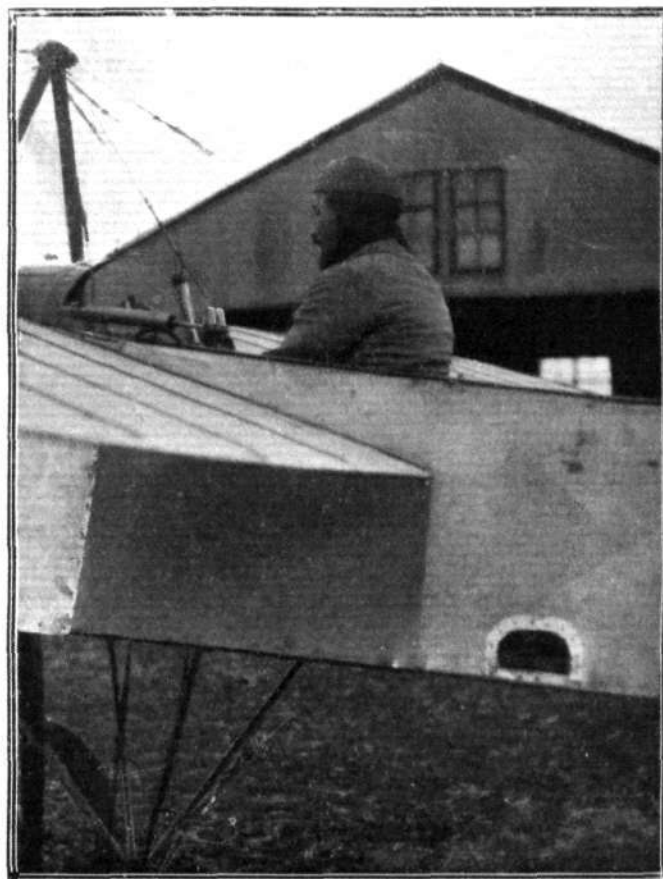
Brighton-Shoreham Aerodrome.

ON Saturday last the flying conditions were ideal the greater part of the day, and Lieut. Lawrence gave exhibition flights during the morning. The C.E. biplane has been putting in good work and is proving a very manageable machine, she is extremely steady and answers readily to her controls; she would be an excellent 'bus for school purposes. On Monday morning Lieut. Lawrence flew to Eastbourne on the Blackburn monoplane, covering the 32 miles in 26 minutes, there being a following wind which increased from 8 m.p.h. when he left Shoreham to about 30 m.p.h. by the time he landed. As he approached Eastbourne, at an altitude of 2,500 ft., his engine failed and he was forced to come down on to the beach, and although several ballast trucks were right in the path of the forced *vol plane* he managed to elevate the machine sufficiently to clear them and so landed without damage. The fact that Lieut. Lawrence has only recently taken to the monoplane, this being but his seventh flight on this type, speaks volumes for the capabilities of this popular officer as well as for the efficiency of the machine, which, by the way, is the same Mr. B. C. Hucks used for his tour in the west of England and the Circuit of Great Britain.

Brooklands Aerodrome.

ON Wednesday week, Kemp was out in the morning flying circuits on the Flanders, and taking passengers, also Lark rolling and hopping on same machine. Young and Setti were both making straight flights on the Green-Avro; whilst at Percival's school, a pupil, Cannon, was rolling. Work then stopped while Lieuts. Smith and Carfrae both took their tickets, and while Capt. Raleigh passed half the necessary tests, all three pupils flying very well indeed. Later, Setti had the misfortune to place the Avro on its head in the sewage farm, but luckily escaped without harm to himself. Sopwith flew the Wright for some time, and then handed machine over to Raynham, who is already handling this machine in a masterly fashion. The latter then took up several passengers, including Parke, Watkins, and Kemp, also a dog, which after a time appeared to quite enjoy the dives and turns he experienced. At the Deperdussin school Gill was making hops and Capt. Massey rolling. Kemp, after circling the ground in excellent form on the Flanders, took up Parke for a "joy

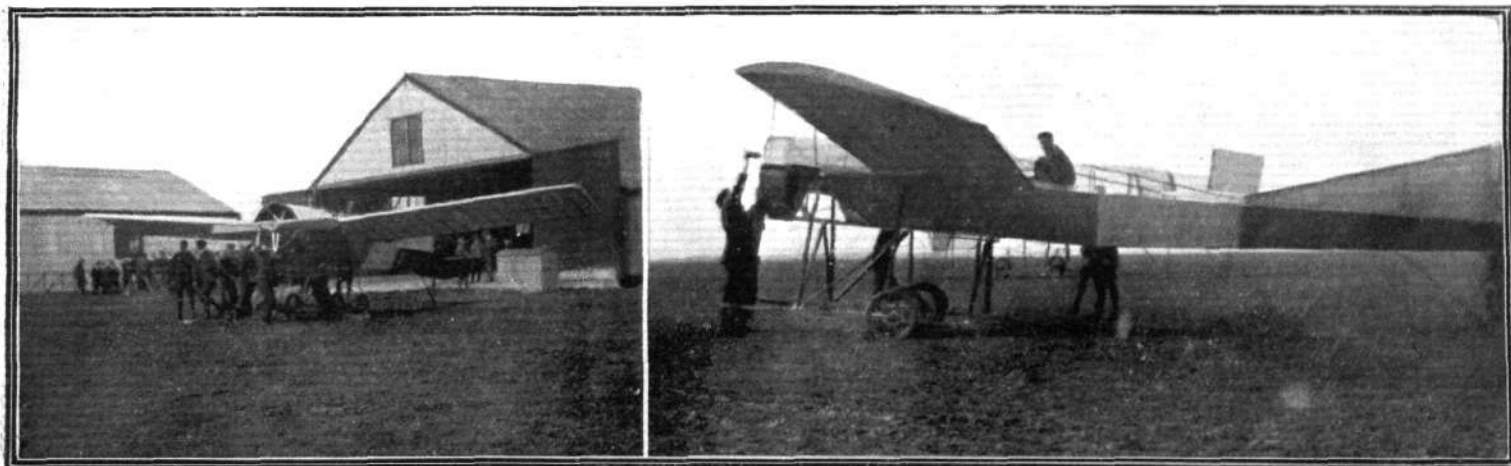
ride," which he appeared to greatly enjoy. Capt. Allen put in some practice on the Bristol monoplane, which seems to have a fondness for chasing its tail when at low speeds on the ground. Manning



Commander Samson at the lever of the new Short monoplane, on which he carried out successful tests on Saturday morning last.

and Lark were at work on the Flanders, rolling and making short "straights" a few feet off the ground. Fleming was out with Nesham, who, including Raleigh, Longcroft and Cafræ, subsequently flew some circuits. Fleming again, with Major Sir A. Bannerman, and Pizey with Capt. Broke-Smith, gave instruction in lever control. Allen and Lane practised on the monoplane, the former again buckling a wheel.

On Thursday, there was no flying beyond two "straights" by Pizey in the morning, with Capt. Broke-Smith, as the weather turned out very bad. Friday was also a blank day.



Lieut. Spencer Grey and the Blackburn monoplane, with which he has been carrying out exceedingly successful flights at Eastchurch. On the left, the monoplane being brought from the hangar. On the right, the engine being primed preliminary to starting.

On Saturday morning an interesting visitor was the Army Aircraft machine, which came over from Farnborough, carrying Messrs. De Havilland and Green. Unfortunately it was, in two senses, a flying visit, for the machine departed before everyone had time to examine it. It did, however, create a very favourable impression, its finish, workmanship, and climbing power leaving little to be desired. At the Bristol School, Fleming took Capt. Broke-Smith as passenger, giving him instructions in lever control. Capt. Raleigh and Lieut. Longcroft each flew some good circuits, the former getting over his old-time preference for low flying and reaching 300 or 400 ft. Capt. Allen, after a figure of 8 on the monoplane, set off again and found himself close to the sewage farm. Trying to bring machine up too fast he dropped the tail too low, and pancaked into the soft ground. Machine turned over on him and buried one wing two ft. in the earth, but without seriously damaging him or itself. The propeller, of course, was broken, also one front skid, and the engine crank case was cracked. The makers are to be congratulated on the way the little machine "stood up" under such a test. Pizey then took as passenger Major Calthorp of the War Office, a prospective pupil, and Fleming was out giving instructions to Major Sir A. Bannerman. The Deperdussin School was hard at work, Petre (head pilot), Sabelli, Partridge, Gill, and Capt. Massey, all being out at various times. Kemp accomplished some very fine flights on the Flanders during the afternoon, and Manning, when rolling on this machine, successfully brought her over the corner of the sewage farm when suddenly confronted by this treacherous and sometimes invisible piece of the ground. Sopwith was out both on the Wright and on the 70-h.p. Blériot, both machines flying splendidly. To-day also saw the reappearance of the Walton-Edwards machine, on which engine tests were carried out. Congratulations to Blackburn, its pilot, on his recovery from a serious attack of pneumonia.

On Sunday the Flanders was first out, piloted as usual by Kemp, who gave Maurice Wright a passenger trip. Also later, just before lunch, Kemp accomplished some good circuits with sharp turns, the machine flying splendidly though noisily, the latter fact owing to a cracked exhaust pipe which had been removed. Partridge and Gill were making straight flights, Capt. Massey rolling, Sabelli and Petre making circuits on the various "Dep." machines. The Wright was out, first with Raynham up, and then Sopwith taking up Howard T. Wright. Kemp was up again for about half an hour, followed by Manning rolling. Raleigh and Longcroft were both flying well on the Bristol and Pizey was up with Major Bannerman. Tom Garne, an old Bristol pupil, who had a smash on a Blériot at Huntingdon a few weeks ago, came down and had a flight on the Bristol. Pizey gave a good exhibition, going up to a high altitude and coming down in a spiral *vol plané*. A most regrettable accident then happened to Lieut. Watkins, who was flying Spencer's biplane. It seems that he must have thought himself about to be struck by another machine's down-

draught, for as he turned to the left, he made a steep dive, and fell swiftly, working his elevator the whole time backwards and forwards. The machine was completely wrecked, and Watkins, we are sorry to say, was found to be suffering from a broken thigh bone. He was removed to the hospital, and at present we cannot say whether the X-rays photograph of the injury shows the necessity of an operation. All hopes are entertained of a quick and sure recovery.

On Monday morning Lieut. Longcroft was successful in obtaining his *brevet* on the Bristol. Kemp was flying circuits, and Jacques was rolling on the Flanders. Wind and rain then came on, and continued most of the day.

On Tuesday also a strong south-westerly gale prevailed, and effectively stopped all work in the air.

Eastbourne Aerodrome.

SATURDAY week was ideal for flying, Messrs. Yates, Gassler and Fowler all being out in the morning. In the afternoon there was quite a large attendance of visitors, amongst them being the Mayor and Mayoress of Eastbourne. Mr. Gassler opened the afternoon by doing short flights on the Anzani, after which Mr. Fowler took up the Gnome-Blériot, making two flights of about 18 minutes each. Lieut. Lawrence's visit was being looked forward to, as he had written to say that he was only waiting for a favourable day to fly over to Eastbourne on his Blackburn.

Saturday last was again a busy day. In the morning Lieut. Lawrence wired to say he was starting for Eastbourne. We had, however, hardly got the flag up when another wire arrived to say that owing to the wind being somewhat gusty he would postpone his visit until the afternoon. A large crowd arrived at the aerodrome in the afternoon in anticipation of seeing Lieut. Lawrence, but by four o'clock no message had been received from him, and, as the visitors appeared rather anxious to see something, Mr. Fowler took the Gnome-Blériot out for a short spin.

On Sunday Messrs. Allen, Parr and Slack honoured us with a visit. They were looking for M. Salmel, who intended landing here to fill up, on his return journey from Paris. Unfortunately, he had to give up, owing to fog, so we did not have the pleasure of welcoming him.

At 8.45 a.m. on Monday a telephone message came through from Shoreham to say that Lieut. Lawrence had started, and at about 9.20 a.m. we sighted him above Beachy Head, heading direct for the ground. After passing right by the ground at a fine pace, he commenced to turn so as to be head to wind for landing. Unfortunately, at the critical moment, his engine gave out and he was compelled to come down on the beach. It speaks well for both machine and pilot that nothing was damaged, as the beach does not make an ideal landing place. The usual crowd soon collected, but with the help of our trolley we soon had the machine housed. Lieut. Lawrence intends leaving at the end of the week for Dover.

Liverpool Aviation School, Sandheys Avenue, Waterloo.

THE school was again busy on Saturday last, when Mr. Melly brought out the two-seater Blériot to test the engine, which has not been run for some time. It was found to be in excellent tune, and only the puffiness of the wind prevented a flight being attempted. Mr. Hardman and some prospective pupils assisted. A curious and not altogether agreeable defect had previously been discovered, the gravity petrol-tank, which is brass, being found to be in a state of disintegration, the metal being quite perished all over, and a new tank had to be hurriedly built to replace it. The reason for this is inexplicable, as the other two tanks appear to be in quite good order. It would be interesting to know if anyone else has had a similar experience.

London Aerodrome Collindale Avenue, Hendon.

Grahame-White School.—Mr. Lewis Turner out on Biplane No. 2 on Wednesday of last week, found the engine running badly, so handed machine over to engineers. Later he was out testing and engine was then running well, so he vacated pilot's seat to Mr. Fowler, who flew a couple of circuits. Rain and fog, however, made flying so very unpleasant that further work was abandoned.

Thursday and Friday, climatic conditions prevented outdoor work, but on Saturday weather had greatly improved and a full day's work was put in. Mr. Lewis Turner was out early with Biplane No. 2, and flew several circuits with Mr. Biard as passenger. He then made a couple of test flights on Biplane No. 1. Messrs. Biard and Gates taking turns on Biplane No. 3, doing straights and circuits. Fowler made several circuits on Biplane No. 2. During the afternoon Mr. Grahame-White was making many flights on Biplane No. 2, on one occasion making an extended trip, passing over Mill Hill, Harrow, and the surrounding country, after which he gave one of his inimitable exhibitions of banking and turning in quick succession, the various schools at the aerodrome suspending operations in order to witness the demonstration. He then took for passenger flights Mr. and Mrs. Douglas Gordon and Mr. Harold Arkwright. Mr. Gates and Mr. Turner both followed with solos on the same



A group of pilots at Eastchurch. Reading from left to right, Capt. Gordon, R.M.L.I., Lieut. Spencer Grey, Lieut. L'Estrange Malone, R.N., Eng. Lieut. Randell (back to camera), and Capt. Gerrard.

machine, the latter afterwards had Mr. Biard up in the passenger seat for instruction in right-hand turns. Meanwhile Mr. Ramsay on Monoplane No. 4 was showing great improvement after personal instruction from Mr. Grahame-White, Mr. Turner finishing the day's work by a flight of three circuits with a passenger at an altitude of 500 ft.

Sunday again was ideal flying weather, although dull. Mr. Grahame-White took Biplane No. 2 for an extended flight in the direction of Edgware, finishing with a magnificent spiral *vol plané* from an altitude of a thousand feet. Following this he took Mr. Gates in the passenger seat, who manipulated the control lever according to instructions, the combination producing some characteristic evolutions, Mr. Harry Delacombe and Mr. Maurice Ducrocq being interested spectators of the exhibition.

A.S.L. Flying School.—Wednesday last week opened with a dead calm, though the fog was very trying. At 9.30 a.m. Ridley-Prentice was flying circuits, by way of a trial flight, on the school machine. He ascended a couple of hundred feet, and terminated with a well-judged glide near the hangars. Having ascertained that the conditions were perfect, Mr. Busk took over control of the same machine, and flew extremely well. Meantime, Ridley-Prentice went out on the Gnome-Valkyrie racer, and put up several very good flights, his landings being particularly good. Mr. Busk, with his usual keenness, stuck to it until the fog was very dense; finally he lost himself altogether, and unfortunately ran into the wire fence by the railway. The Valkyrie skids saved the machine, for they ran right up over the fence, no damage being done beyond badly straining some wires. Ridley-Prentice finished up by giving a short passenger flight to Mr. J. D. North on the racer.

Saturday morning was again fine, but a hot sun shining on the very wet ground rendered the air exceptionally tricky. Nevertheless, Ridley-Prentice got in some practice on the Gnome racer, and later on the Green-Valkyrie.

On Sunday evening Mr. Barber went out on Valkyrie No. 11, and put up a fine exhibition flight. He ascended 600 ft. or more, and carried out all kinds of effective aerial manoeuvres, terminating with a faultless glide, landing close to his hangar.

It blew half a gale on Monday and Tuesday, and no flying was possible.

Blériot School.—Monday and Tuesday last week were much too windy for outside work but on Wednesday the wind moderated and



Mr. Cutler on the Short biplane.

quite a lot of useful work was put in by Messrs. Hall, Pothet and Clappen, who were all practising straights, Mr. Pothet also doing short hops.

Next day the wind started again after the previous day's lull, much to the inconvenience of the pupils who had therefore perforce to confine their attention to work inside the hangars. A like state of affairs prevailing on Friday.

Saturday the weather was quite fine, and M. Pothet started by doing straights. Finding no wind to bother him, he got up in the air any old straight flights instead. Messrs. Morris, Hall and Clappen were also out and improving in their handling of the machines, and a straight flight is only a matter of a few days, in fact, during one roll Mr. Hall got right off the ground and flew about 150 or 200 yards without knowing he was doing it and was quite surprised when he was told the reason why the jolting felt in running over the ground had suddenly ceased for a time. Mr. Prenssiel had meanwhile gone aloft on the *brevet* machine with the intention of obtaining his certificate. He flew the first part in perfect style, and went up for the second but after a brace of eights decided to discontinue temporarily as the engine appeared to be a little loose in the frame. He is going to finish his tests on Tuesday, weather permitting.

W. H. Ewen School.—On Wednesday, Mr. Denys Ware, the latest pupil, made a good straight roll at his first attempt, without once having to get out and straighten. At his next attempt he was rolling confidently with tail well up. Baumann and Dubois each made several fine flights with beautiful landings from 20 ft. and 30 ft.

On Saturday, the pupils were out all day practising. Dubois, Baumann, and Warren put up several good, steady flights, each at heights varying from 15 ft. to 30 ft., while E. H. Lawford got in some good rolling practice and managed a few hops. During the afternoon Ewen made a nice flight of 20 mins., rising to 400 ft., and returning to the aerodrome with a fine spiral *vol plané*.

On Sunday the pupils were out early, but the wind did not drop sufficiently for school work until the afternoon, when a great amount of practice was put in. Baumann, Dubois and Lawford were out on the Blériot, each showing splendid improvement. Ewen brought out the Deperdussin, and after a short trip handed her over to Capt. Loraine, who put up a beautiful little flight, banking steadily at his turns, and finishing with a nice *vol plané* at 100 ft. Ewen then gave an exhibition for the benefit of some visiting pilots from Brooklands. Rising to 500 ft., he went up the Edgware Road as far as Canon's Park, and circled back again by Mill Hill, finishing with a splendid long glide from 400 ft. Capt. Loraine was then up again, flying around with confident ease.

Excepting for a short spell of calm on Monday morning, the wind continued very boisterous all Monday and Tuesday, preventing any school work.

Salisbury Plain.

Air Battalion.—A welcome change in the weather conditions made it possible for quite a deal of good scouting practice to be put



Mr. Marcel Desoutter, one of three pupils who qualified for their certificates at the Blériot School, Hendon, last week.

in on Wednesday of last week. Capt. Loraine was flying biplane "F. 4," and afterwards made a cross-country flight in the direction of Devizes on Biplane "F. 5." Lieut. Hynds was next out on the Breguet and put up a 45 minutes flight at a good height. Lieut. Barrington-Kennett followed on the Nieuport, making one trip of 25 minutes duration and another of 40 minutes duration, the height varying between 800 and 1,000 feet, round Salisbury and Porton. Lieut. Reynolds was also out, handling his biplane in perfect style and finishing by one of his usual *vol planés*. On Thursday and Friday the weather confined work to the hangar, but on Saturday Capt. Loraine on "F. 4" made seven flights with passengers, being in the air for two hours altogether. Lieut. Reynolds then took charge of the biplane and made one or two trips with passengers, while Lieut. Hynes on the Breguet made three passenger trips, each time landing from a height of 400 ft. by a fine glide. There was no flying on Sunday, Monday or Tuesday, but the hangars presented a busy scene. It is good news to hear that Lieut. Manisty is making good progress and hopes very shortly to recommence active work in the air.

Bristol Schol.—Flying has been considerably restricted during the past week owing to the inclemency of the weather. However, during the fine intervals, useful and instructive work has been carried out.

No attempt was made at outdoor work Monday, rain falling in torrents the whole of the day, and work was, therefore, transferred to the hangars. Tuesday morning was very dull with a stiff breeze blowing. Jullerot made several trial flights but decided to postpone school flying.

Wednesday was a decided improvement upon the weather experienced during the two previous days, and the work was started at an early hour, Jullerot, after the usual trial, taking Colonel Defilipi for a trip, and, immediately afterwards, ascending with Lieut. Fielding. Mr. Bendall then made a good solo flight on one of the Bristol biplanes, having Lieut. Fielding as his passenger. Mr. Bendall was also away again immediately afterwards testing an engine that had just been fitted to machine No. 43. Commander Schwann gave a really clever exhibition in the four consecutive flights which he made, and when it is borne in mind that this pupil's first flight was just over a week ago, it will be seen what good progress he

has made. Lieut. Brodigan was out for three solo flights, making figures of eight and fine banking. Lieut. Harrison was also up for four flights, carrying out some good right and left-hand turns with fine banking, and it may be added that both of these pupils are ready to undergo the necessary tests for their *brevets*, and given a favourable opportunity this should easily be accomplished. Prier was out on one of the Bristol two-seater military monoplane, Lieut. Defilipi being his passenger, and Jullerot ascended with Lieut. Fielding for a tuition flight, afterwards taking up Lieut. Ercole, who has recently joined the school. This latter officer was also taken up by Lieut. Harrison, and then Lieut. Wyness Stuart made three good flights on one of the biplanes, effecting fine landings in each case. Jullerot brought a good day's work to a close by taking up Lieuts. Fielding and Ercole for tuition flights.

Thursday was not nearly as favourable as the previous day, there being a rather gusty wind blowing. However, Jullerot made an ascent, and then took up Lieuts. Fielding and Ercole for two flights each, but heavy rain prevented further work being done. Friday was hopeless, and all thought of flying had to be abandoned.

On Saturday morning Jullerot was testing the conditions, which he found to be very favourable, and Lieut. Harrison started out with two solos in fine style, Jullerot taking Lieut. Fielding for a tuition flight, Mr. Bendall also being out with Lieut. Ercole as passenger, this latter pupil being also taken by Jullerot. Lieut. Harrison was again up shortly afterwards with Lieut. Fielding as passenger.

In the afternoon Jullerot found the wind a little too strong, but upon ascending later he found things much calmer, and school work was, therefore, started off briskly, Lieut. Head making two circuits in good style, Lieut. Ashton also being out for a solo. Lieut. Head then started out for the second part of his certificate, the tests for which he passed in fine fashion, being observed by Mr. Cockburn.

Jullerot was again up with Lieuts. Fielding and Ercole for tuition flights, the instructor letting his pupil take charge of the machine in each case.

All Sunday it was pouring with rain, accompanied with a stiff breeze.

No improvement had taken place on Monday, so work was proceeded with in the hangars.



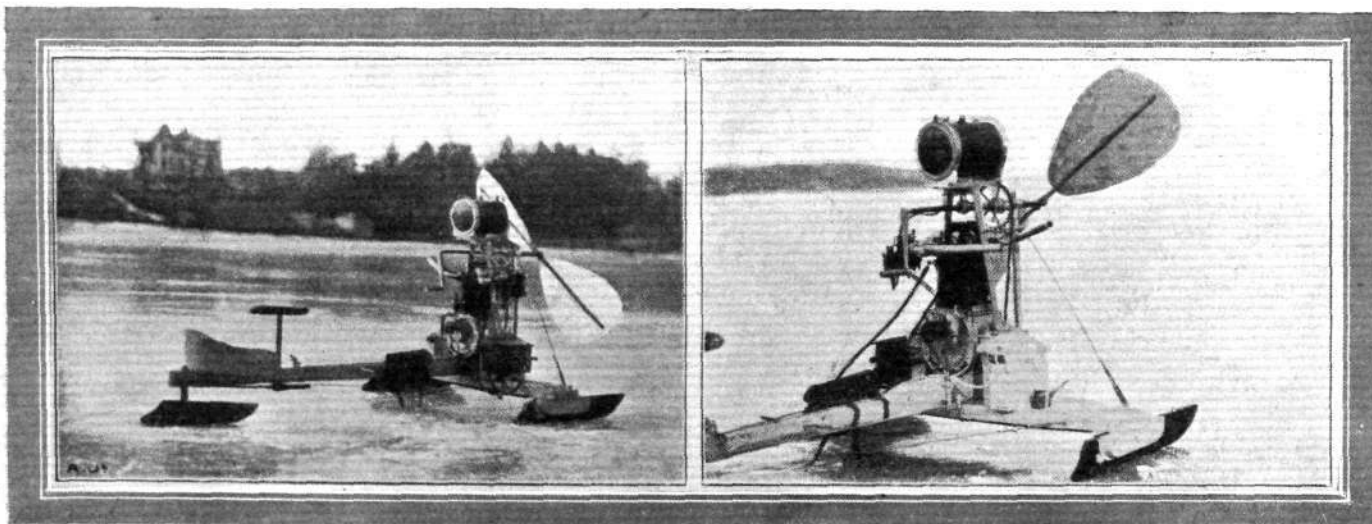
Vedrine Regains the Speed Records.

STILL the chase for the speed records goes merrily on, and once more the records as far as 200 kiloms. stand to the credit of Vedrine. At Pau, on the 22nd ult., in splendid weather, he mounted his Deperdussin machine, now fitted with 130-h.p. Gnome engine and Normale propeller, and starting off at an amazing speed, had covered well over 39 kiloms. in the first quarter of an hour. Reeling off laps with great regularity, he went on until he had covered 200 kiloms. in 1h. 15m. 20 $\frac{1}{2}$ s., and then decided to come down. From the following table it will be seen that he was well inside Bathiat's disputed records, and whereas Bathiat's fastest speed was 147 kiloms. an hour, Vedrine's best time for a single lap shows that the greatest speed was 20 kiloms. better than that. It works out to 169 k.p.h. (105 $\frac{1}{2}$ m.p.h.). It will be seen, too, that Vedrine was nearly 40 mins. better than Tabuteau's record for 200 kiloms. :—

		New Records.	Old Records.
50 kiloms.	...	oh. 19m. 3 $\frac{1}{2}$ s.	oh. 20m. 43 $\frac{1}{2}$ s.*
100 "	...	oh. 37m. 58 $\frac{1}{2}$ s.	oh. 41m. 29 $\frac{1}{2}$ s.*
150 "	...	oh. 56m. 41 $\frac{1}{2}$ s.	1h. 2m. 43 $\frac{1}{2}$ s.†
200 "	...	1h. 15m. 20 $\frac{1}{2}$ s.	1h. 54m. 21s.‡
$\frac{1}{4}$ hour	...	39'303 kiloms.	35 kiloms.†
$\frac{1}{2}$ "	...	79'303 "	70 "†
1 "	...	159'303 "	142'43 "†
		* Bathiat.	† Vedrine.
			‡ Tabuteau.

Tabuteau Gets the Two-Hour Record.

ON the 23rd ult. Tabuteau on his new Morane monoplane fitted with a 50-h.p. Gnome engine tried for the speed record at Pau, but only succeeded in improving on his own figures for two hours, increasing his record of January 25th last of 205'287 kiloms. to 227'454. He was flying for two hours and ten minutes and covered altogether 245 kiloms. His time for 200 kiloms. was 1 hr. 45 mins. 14 $\frac{1}{2}$ secs.



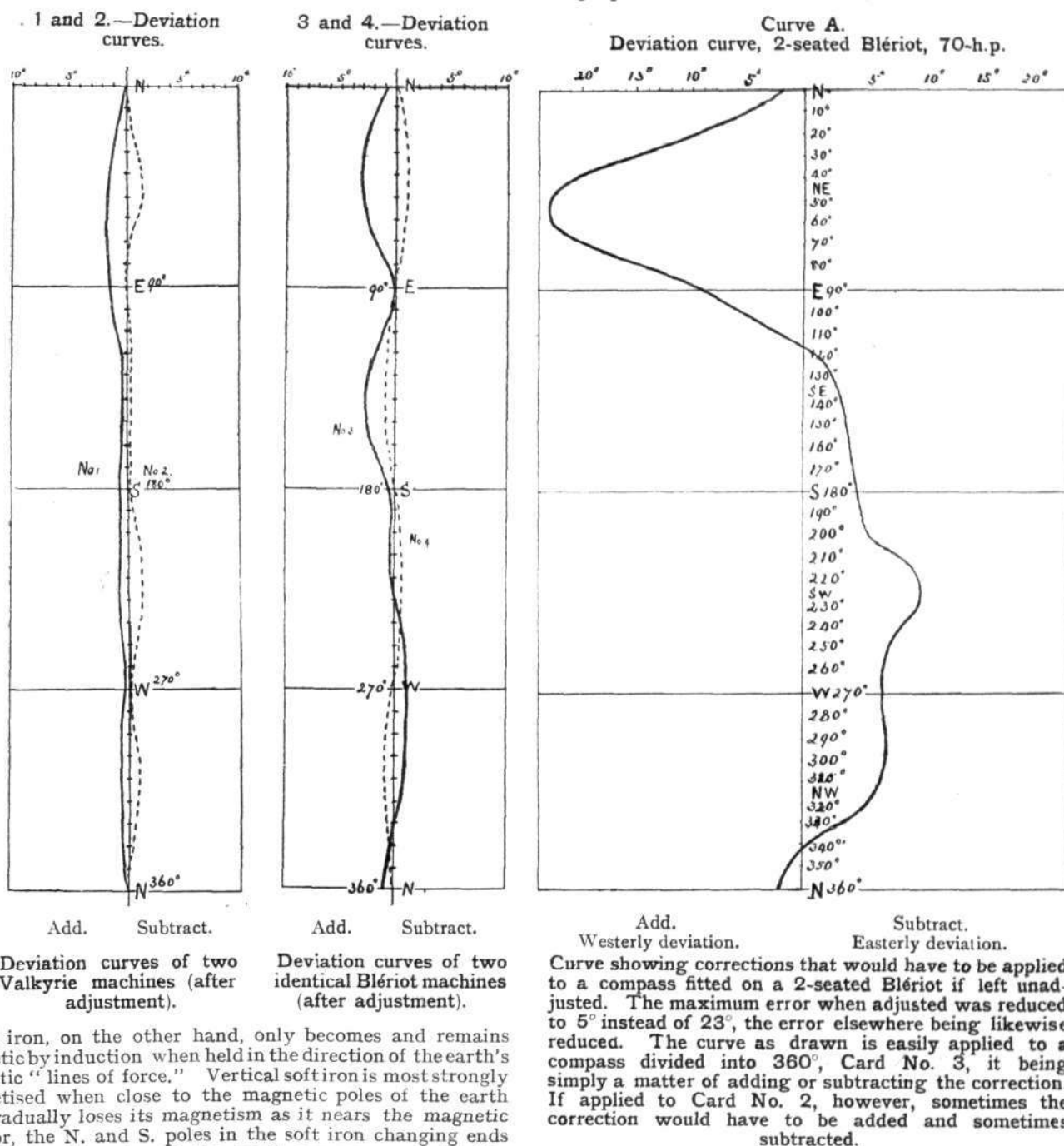
The above photographs show a "skate boat" which has been seen skimming over the ice in the neighbourhood of New York lately. The aerial tractor-screw is driven by a 2-cyl. 12-h.p. air-cooled Buchet motor.

THE MAGNETIC COMPASS— ITS CONSTRUCTION AND USE.

(Concluded from page 165.)

IN considering what action any particular portion of an aeroplane may have on a compass it is necessary to know whether it is of hard steel or soft iron. Hard steel from various causes, such as hammering, &c., can become permanently magnetised, and when built into a machine may have its poles left in such a way as to act strongly on the compass. These poles will not reverse whatever the direction of the head of the machine.

These are some of the reasons why it is absolutely essential that the amount and direction of the deviation on any particular machine must be obtained on every position of the aeroplane's head. The process by which this is done is termed "swinging" the ship, in nautical language. The same principle is employed in the case of an aeroplane, but the difficulties are generally greater, because of the nearness of large quantities of iron and steel, and because this iron and



Soft iron, on the other hand, only becomes and remains magnetic by induction when held in the direction of the earth's magnetic "lines of force." Vertical soft iron is most strongly magnetised when close to the magnetic poles of the earth and gradually loses its magnetism as it nears the magnetic equator, the N. and S. poles in the soft iron changing ends as the opposite poles of the earth are approached. The magnetism induced in vertical soft iron remains constant whatever the position of the aeroplane's head, though the effect on the compass varies from nothing when in line with the needles to a maximum when at right angles.

Horizontal soft iron at the earth's magnetic poles has no magnetism, but gradually becomes magnetic as it is moved towards the magnetic equator, provided it is kept pointing to the magnetic poles; the magnetism varies with every position of the machine's head; it also has a varying action on the compass as the needle turns.

steel is nearly always massed either all forward or all aft of the compass, instead of being more or less equally distributed as it is on a ship. A large error can also be introduced by the angle of ascending or descending and banking at corners, &c.

Before "swinging" the aeroplane it is advisable to run the engine whilst on the ground, if no movement whatsoever of the compass card takes place; it can be taken for granted that the compass will be satisfactory in the air when properly adjusted for deviation. If, on the other hand, there is a movement,

however slight, it is advisable to determine whether this movement is due to vibration or due to generation of electric current in magneto, wires, &c. This is sometimes very difficult to do. Under these circumstances, in a passenger-carrying machine, the writer always makes a point of testing the compass in the air himself. Generally speaking, if the movement of the card when on the ground is due only to vibration, it becomes perfectly steady when in the air—that is, with a properly designed compass—if, notwithstanding the absence of any sign of vibration, the compass does not point as it should on some known course, this is probably due to magneto or electric current in switch wires. In this test the aeroplane's head is placed when on the ground pointing at some definite object in the distance; the bearing is then noted by the compass on the machine, and when in the air the machine is flown vertically above the same ground with its head on the known object; the compass bearing should then be the same. Of course, as the compass has not yet been adjusted, the course shown by the compass is probably not correct magnetic, but that is of no consequence, as it is simply a matter of comparison between compass bearing on the ground, engine stationary, and bearing in the air, engine running. Having made sure that vibration and magneto are not affecting the compass, the adjustment can now be taken in hand.

The machine's head is put first on correct magnetic north, and the compass error, if any, noted, both amount and direction, and corrected by placing magnets in suitable positions. The machine's head can then be put on S., the error again noted, and if necessary corrected, only it must be remembered that correcting on S. will also effect the correction on N., and probably increase it, so that it may be necessary to divide the error equally between N. and S. E. and W. is then treated in the same way. Having worked the error out as far as possible on the cardinal points, the machine's head is now placed on the quadrantal points, N.E., S.E., S.W., N.W.; the errors here are corrected as far as possible, and after taking tests to determine what difference is made by putting the machine in the position of flying, ascending and descending, the levers are moved from their normal position for a further series of tests. A note is made of these results, and the engine (when a Gnome) is rotated into three or four different positions to make sure that the cylinders are not affecting the compass, in one position more than another.

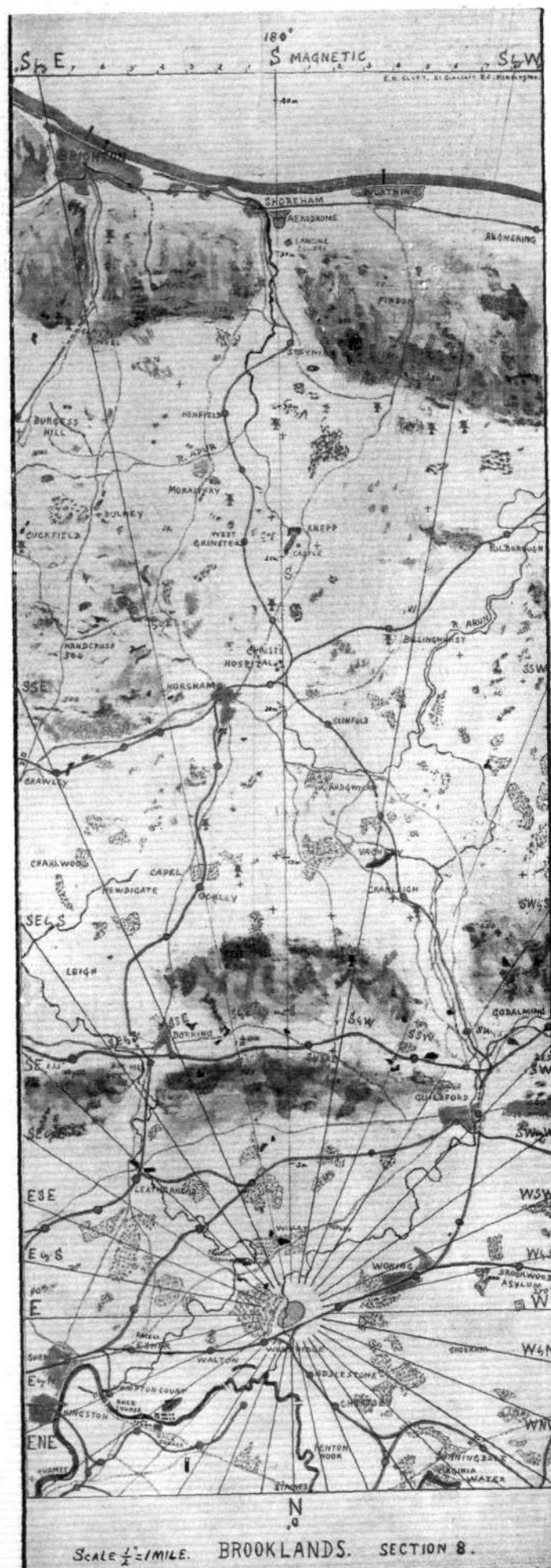
It is of very great importance to observe that the various assistants (frequently energetic amateurs) on this work, do not lean over the compass adjuster, as their pockets are almost invariably full of iron spanners, bolts, nuts, spare parts, and a very careful watch must also be exercised to see that these same assistants do not in their eagerness to work leave loose magnets, plyers, &c., hidden away in recesses of the machine. The writer has wasted hours through discovering a large spanner resting securely under the pilot's seat after the whole of the adjustment was completed. Of course, the spanner was removed and the job had to be done all over again.

The uncorrected error varies greatly on different machines; for instance on the 100-h.p. Nieuport (the Gordon-Bennett machine), the error was nearly 80° on some points. The engine is very near, very massive; 14 cylinders and two magnetos are fitted very close to the compass. Another difficult machine was the Etrich with its 120-h.p. 6-cyl. engine and steel fuselage, landing chassis, &c. The compass had to be fixed against the side of the frame and was many degrees wrong, but although it was impossible to remove the whole of the error, the compass could in this case be relied upon, all that was necessary being to apply a rather large correction on some points.

The average Blériot machine is fairly good, the error being in most cases reducible to about 3° in the worst position. The Antoinette is also a good machine, whilst the Martin-Handasyde is extremely bad, magnetically, at the moment owing principally to the steel control column, the error after correction being nearly 10° all round. The Deperdussin and Morane are both much the same as the Blériot.

The Bristol machines are all good, the Bristol with Renault engine requiring no correcting magnets of any description. The monoplane, however, had a maximum error of 5° after correction.

The Howard-Wright biplane is the best the writer has so far adjusted, as it seems to be the only machine in which all moving parts near the compass have been purposely made of non-magnetic material.



An early chart prepared by Mr. E. H. Clift for use by an aviator flying from Brooklands to Shoreham.

Curves No. 1 and 2 show the corrections that had to be applied to the compasses fitted into two Valkyrie machines. Although practically identical, the deviation is considerably different, in one case being all westerly and in the other all easterly. The maximum deviation in both cases has been reduced to about 2°.

Curves No. 3 and 4 show the deviation in two compasses fitted to 50-h.p. Blériot machines. The deviation in each case is both easterly and westerly; the maximum deviation in No. 3, however, is nearly 4°, whilst in No. 4 it is only 1.5°.

To look at the machines externally, curves Nos. 1 and 2 should have been identical, as also should Nos. 3 and 4. The conclusion to be drawn is that a compass cannot be taken off one machine and put on another exactly similar one without readjustment.

To use these curves all that is necessary is to first obtain from the map the correct magnetic course it is desired to steer. Supposing we are dealing with machine No. 4, and we wish to steer a course of say 40°; at 40° the deviation is 1° easterly, subtracting giving us the compass course as 39°.

If, on the other hand, we were working with machine A, which has been "swung," but has been left *unadjusted*, and we wished to steer the same course, the deviation at 40° is 21° westerly, which has to be added = 40° + 21° = 61° compass course.

Now supposing that in flying the machine's head swings



The Clift Compass.

In the inscription appended to the illustrations of the Clift compass which appeared in our last issue reference was made to an adjustable lubber point. This referred to the movable pointer, attached to the compass dial, which Mr. Clift prefers to call a course pointer. It should be noted that the Clift compass has no adjustable lubber mark as might perhaps be imagined by a cursory glance at the sketch which appeared last week.

Mr. Hewitt has a Rough Landing.

ON Saturday last Mr. Vivian Hewitt started on a flight with his Gnome-Blériot from the Foryd Aerodrome, Abergele but when only about 100 feet up the petrol pipe broke and the engine stopped. He was just leaving the aerodrome at the time and had no chance to turn into it. The machine did a tail slide, then pancaked and afterwards started gliding. By that time he was only about 30 feet up and after hitting a ditch and bouncing along frightfully uneven ground the machine pulled up at the edge of another ditch. Fortunately nothing was broken, but it was necessary to dismantle the machine to get it back to the aerodrome.

Good Flights by Mr. Gnosspellius.

HAVING overcome the trouble with his hydro-monoplane, Mr. Gnosspellius made a very good flight of about two miles over Lake Windermere on the 21st ult.

Rudyard Kipling Again Prophesies.

IN the March issue of the London Magazine, Mr. Rudyard Kipling again adopts the rôle of prophet, and attempts to portray, in his usual vivid manner, what he imagines will be taking place in A.D. 2150. While the story, of which this forms the first part, promises to be full of human emotion, with all its thrills, there will also be a strong scientific interest. Aircraft, of course, play a large part, and are depicted as being very powerful; in fact, the world is then entirely dominated by ships of the air. The aeroplanes of to-day are looked upon as but for children.

A Naval Aviation Station at Dover.

IF our army aviators are only to indulge in cross-country flights between Salisbury and Aldershot, there is a possibility that the slowly growing number of naval flyers may be restricted to getting their cross-country practice between Eastchurch and Dover, as some hangars are being put up at the latter station for the naval officers training at Eastchurch.

The Lake Windermere Fuss.

PRESIDED over by Sir Wm. Anson, M.P., a meeting of Members of Parliament and others interested in the preservation of the natural beauty of Lake Windermere met at the House of Commons on the 20th ult. After some discussion, in the course of which it was suggested that many visitors were driven away from the district by the hydroplanes, it was decided to ask the Home Secretary to make regulations under the Aerial Regulation Act, 1911.

10° off its course, making it bear by compass 51° instead of 61°, the actual correct magnetic course flown then becomes only 34°, or an actual difference of 27° between course flown and the desired course, a very serious matter, showing the danger of using an unadjusted compass, even if the deviation is known.

The writer came across a rather curious case in which two small steel tubes were replaced by two exactly similar ones in a portion of a machine; nothing else was altered, the tubes were the same length and thickness, and yet they put the compass many degrees wrong. The only explanation seems to be that either one or both sets of the tubes were hard and had become magnetised. On replacing the new sets the poles were inverted and thus produced this result.

It must not be overlooked that in speaking of good and bad machines in the preceding paragraphs, reference is only being made to their qualities as far as ease of compass adjustment is concerned. This, of course, has no connection with their flying abilities.

This article only attempts to deal with the fringe of the subject in a very elementary way, but if it leads aviators, manufacturers and their mechanics to understand how important it is that no alterations in an aeroplane should take place after a compass is adjusted, it will have fulfilled its purpose.

ERIC H. CLIFT.



An Artistic Blériot Publication.

VERY delightfully got up, with all the charm of distinctly French design, is a booklet entitled "Blériot Aeronautics, 1912," just to hand from Mr. Chereau, the British representative of M. Louis Blériot, at Belfast Chambers, 156, Regent Street, London, W. Although it is a catalogue it contains a lot of information useful to those seeking to take up aviation, and it is illustrated by a large number of splendid photographs.



Mr. Gordon Bell standing in front of one of the R.E.P. monoplanes on which he has been making such splendid flights during the past few weeks over Buc and the surrounding country.

FOREIGN AVIATION NEWS.

The Ae.C.F. Grand Prix.

ANGERS has been selected as the starting point of the competition for the Aero Club of France's Grand Prix, which is to be held about the middle of June next over a cross-country circuit of about 150 kiloms. The full distance of the race will be between 500 and 800 kiloms., and while competing machines will have to descend on each round at Angers for replenishment, &c., it is possible that compulsory controls will also be made at other points. Two courses have been inspected by the committee, one having as its points Angers, Cholet and Saumur, and the other Angers, Nantes, Angers. It will be remembered that the first cross-country town-to-town race took place over a course from Angers to Saumur in 1910. The prize fund will amount to at least 100,000 francs, the Aero Club of France contributing half this amount, while 40,000 francs have been voted by the town of Angers.

A Monument to a Pioneer.

AMONG those who sought diligently the solution of human flight by studying the birds, one of the foremost was Mouillard, who died at Cairo in 1897. On Sunday last a monument which has been erected through the instrumentality of the Egyptian section of Ligue Nationale Aérienne was unveiled at Cairo. We are told that as a boy he secured an eagle and studied every movement, and when in 1866 he went to the Polytechnic School at Cairo as a drawing master he turned his attention to the vulture. He evolved the theory of gliding as set forth in his books *L'Empire de l'Air* and *Vol sans Battement*, and many of his ideas were elaborated by Chanute and passed on to the Wright brothers to see their fruition about ten years after their discoverer's death.



The monument inaugurated on Sunday at Heliopolis to the memory of Pierre Louis Mouillard—a Frenchman who, it is claimed, was the first man to devote serious research work to bird flight.

A Governor-General in the Air.

AMONG the visitors to the Maurice Farman School at Buc on Monday was M. Ponty, Governor-General of French West Africa, and his wife, both being taken by Mr. Farman on a biplane over the Chevreuse Valley, Versailles, &c. It will be remembered that the French Military authorities have sent two Farman machines to West Africa for special service.

Grandjean Wins a Prize.

ON the morning of the 21st February, M. Rene Grandjean won a prize of 1,000 francs offered by Davos for a flight above the town visible from the Shatzalp and circling round the church of Johann-Platz. First making a circle above the Lake at a height of 300 metres Grandjean rose about 130 metres higher and made the necessary circuit quite easily.

"Palmar qui Meruit Ferat."

IN a paragraph in our last issue recording the 120 passenger flights made in two days at St. Cyr by the military officers there was a slight omission, as it should have been made clear that they used Maurice Farman biplanes.

Fatal Fall of Lieut. Ducourneau.

THE ranks of French *pilote-officiers* have lost a valued comrade in Lieut. Ducourneau, who met his death while flying a Nieuport monoplane at Pau on Friday of last week. The accident was caused through the propeller breaking, the machine falling from a height of 600 feet into a marsh. The pilot was thrown out whilst in mid-air, being picked up dead some distance from the wrecked machine.

More Honours for French Army Aviators.

THE names of sixteen French military aviators have been put forward for the honour of Chevalier of the Legion of Honour. The list includes Capts. Vogoya and Negre and Lieut. Cheutin of the Infantry, Capt. Lebeau and Lieuts. Chevreau, Mazac, Maillols, and Duperron of the Artillery; Capts. Brenot, Destace, and Kass, and Lieut. Letourneur of the Engineers, and Lieut. Gouin of the Cavalry.

France Challenges for Gordon-Bennett Race.

THE Aero Club of France has sent a challenge to the Aero Club of America for the Gordon-Bennett Trophy, the race for which will this year be held at Chicago. The team of three pilots will, of course, not be named for some time.

Flying to Please an Invalid.

A WISH having been expressed by the *Maire* of Bone, who is lying ill at present, that he would like to see Ehrmann flying, the aviator rose from the flying ground on his Borel monoplane, and after circling over the town and round the cathedral, he passed over the residence of the Mayor, who watched the aviator from his window.

A Sporting Match.

IN view of the rumours which have been circulated as to the "doping" of Bathiat's record-breaking Sommer monoplane, Roger Sommer has issued a challenge to the Deperdussin firm, which, it is said, has been accepted. The challenge calls for a speed match over a course of 50 kiloms. with a 70-h.p. Gnome motor using pure petrol. The stakes are 5,000 francs.

Hanriot School at Antibes.

UNDER the management of the brothers Garbero, a Hanriot school has been started at Antibes, and on the 23rd, by way of making a start with practical work, Joseph Garbero carried his brother for a flight over the Carré fort and then out to sea, circling above the warships at anchor.

The Paulhan-Curtiss Hydro-aeroplane.

LEAVING Juan-les-Pins, Paulhan, on the Curtiss hydro-aeroplane, passed over Antibes and landed at the Grimaude on the 23rd ult. He was away again half-an-hour later, and on his way back twice circled above the Carré fort.

Brindejone des Moulinais Going Back.

STARTING from Perpignan on the 21st ult., on his return journey to Pau, Brindejone des Moulinais landed at Rivesalles, at the invitation of the Mayor. After a few minutes' rest he started again, and crossing the mountains and following the Aude gorges, after an hour and a-half's flying, landed at Minepoix. On landing the propeller hit an iron post and was smashed.

A Practical Propagandist.

IN order that he may be able to speak with authority on the subject of military aviation, M. Ternois, who represents Abbeville in the Chamber of Deputies, has been making long trips with Rene Caudron in the Somme district. He is strongly advocating in the Chamber the formation of a military aviation centre at Crotoy.

New French Superior Pilots.

ON the 20th ult. Ensign Fournic made his second attempt for a superior certificate on a course from Rheims. He was observed by Sapper Seguin who flew over on his Farman biplane to take up a station. He passed his third test on Monday last by going to Vitry-le-Francois and back at a height of 1,100 metres, and at the same time Lieut. Pierra, also on a Farman biplane, made his second test. Lieut. Bruncher on a Deperdussin made his third test over the same course on the 22nd ult.

Laurens at Nice.

ON the 22nd ult., Laurens on his Deperdussin monoplane at Nice won the second Coupe Chatham by flying over the town at a height of 800 metres, and by circling three times above the Casino he won the prize of the Aero Club of Nice. On the previous day he made a very fine flight with a passenger at a height of 1,000 metres above the Villefranche roads.

More R.E.P.s. for French Army.

LAST Saturday Gordon Bell at Buc was testing several new R.E.P. machines constructed for the French army. Among them was a two-seated machine fitted with a 70-h.p. motor, on which, accompanied by Lieut. Campagne, he made a fine flight over St. Cyr. He was engaged in similar work on the 21st ult., when on a three-seater, fitted with a 7-cylinder R.E.P., he was up at a height of 1,200 metres above St. Cyr and the neighbourhood.

Colliex Testing the Sanchez Besa.

AT Issey, on the 21st ult., Colliex was testing a new military Sanchez Besa monoplane fitted with a 80-h.p. Salmson motor. When at a height of 50 metres, he let go of the steering lever while traversing 250 metres, and a photograph taken at the time shows him in the regulation attitude with his arms in the air. During this test the machine proved very stable.

An Hour on the Borel Monoplane.

LIEUT D'ABRANTES, chief of the Borel Military School at La Vidamée, made a flight of over an hour on the 21st ult., reconnoitring the surrounding villages.

Weymann and Tabuteau Fraternise.

AMONG the passengers taken by Weymann on the Nieuport at Pau, on the 22nd ult., was Tabuteau, who was indulged in a little excursion of 75 kiloms. on a monoplane fitted with a 2-cyl. Nieuport engine.

Two Hours on a Blériot-Viale.

USING his Blériot monoplane fitted with a Viale engine, Dancourt was flying on Sunday for a couple of hours at a height of 800 metres above Pertuis.

A Good Flight on a Blériot at Pau.

AT the Blériot Civil School at Pau on Saturday last Maffei was flying across country on his Blériot for over an hour. The same day a well-known American sportsman, Mr. A. C. Menges made the three flights for his *brevet* in splendid style.

Flying for an Hour at Chartres.

AT the Savary Military School at Chartres, on Monday, Reichert, the instructor, made a fine solo flight of a little over an hour's duration. On the same day Frantz, Junquet, and Hembert, each with a passenger, made flights in company in the direction of Orleans.

A New "Hirth" Monoplane.

ON the 21st ult. a new machine made its appearance on the Johannisthal aerodrome, and created no little interest. The German designer, Hirth, is responsible for the machine, which is of a monoplane type and fitted with two propellers, one at the leading edge and one at the trailing edge of the main plane, each driven by a separate 100-h.p. motor, by means of which it is claimed the machine can develop extraordinary speed.

Italy to have a Large Fleet.

THE Italian Minister of War, General Spingardi, has asked the Italian Parliament to provide funds for the formation of an aerial

fleet of 300 aeroplanes and 24 dirigibles. Schools are to be started to train the necessary pilots. At the present time the Italian army possesses 50 aeroplanes and 9 dirigibles.

A Bristol Monoplane in Spain.

By flying across Madrid, from the Celibes Statue to the Royal Palace and back, Busteed, on a Bristol two-seater monoplane, on Sunday last, won the Avia cup which has been on offer for over a year. Busteed passed over the Spanish Capital at a height of 1,500 metres, and was flying for over half-an-hour.

A Hydro-Aeroplane at New York.

DURING the second week in February, Frank Coffyn made a number of flights on a hydro-aeroplane on the Lower Hudson River. He has converted his model B (Wright) biplane by affixing two pontoons made of steel aluminium alloy in place of the usual skids. The machine rises from and alights on the water quite easily, and one time skated over a large sheet of floating ice. On February 7th, he flew round the statue of Liberty, accompanied by a photographer.

An Alarming Experience Over New York Bay.

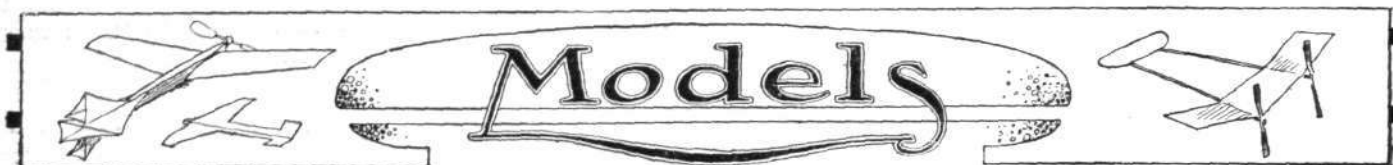
IT is a striking coincidence that while several British pilots found a number of *remous* in the air last Saturday week, Frank Coffyn met with similar conditions in America. While piloting the Wright aeroplane over New York Bay, the machine seemed to drop 300 feet and although the aviator was afraid it was going to capsize, it suddenly righted itself and the pilot was able to bring it down safely. He, however, characterised it as the most exciting experience he had ever had.

A Mishap in India.

WHILE flying a biplane at Peshawar, on February 23rd, in connection with the military manoeuvres, Lieut. H. H. Harford, R.F.A., had a serious fall, sustaining a broken leg and some minor injuries.



Lieut. Dahlbeck, of the Royal Swedish Navy, who is practising flying at Stockholm on the ice, both with a Swedish-built Blériot-type monoplane and his Bristol biplane, the latter machine, he holding, being one of the best he knows.



Conducted by V. E. JOHNSON, M.A.

Weight of Model and Length or Duration of Flight.

Twin v. Single Propeller.

Referring to our remarks *re* the above in January 6th issue—we have received interesting communications from Mr. G. Haddon Wood (Hon. Sec. Birmingham Aero Club), and others.

Mr. Wood mentions amongst other items, that Mr. G. Mason (a club member), with a 15-oz. model, constructed about last April, of 4 ft. span and 6 ft. in length, fitted with a *single propeller*, obtained flights of 90 seconds and over 500 yards; also that Mr. E. E. Noble won the championship of the Midlands in September, 1910, with a duration flight of 48 secs., this machine also had a single screw; and that Mr. E. Trykle's model, which holds the club duration record with a flight of 92 secs. [we thought it was 95], has a span of 30 ins., and a 4 ft. motor rod, *single propeller*, and a total weight of 5 oz. Longest flight not known exactly, but estimated at about 900 yards.

These items with respect to performances made by single screw models are of especial interest and can only cause one to wonder why this type of model is not still more in evidence. So far as the weight of the model and the duration, &c., of the flight are concerned the bulk of the evidence to hand (which we much regret pressure on our space forbids us to allude to more in detail) all goes to show that large rubber-driven models can be built to compete quite successfully against smaller machines. Theoretically, it can be shown that if the *type* be kept the same the distance is a constant quantity, and so far as actual practical construction goes, the advantage lies with the larger model, for it is always easier to build more accurately on a large scale than on a small one, the larger machine will also be less disturbed by wind irregularities, owing, for one thing, to its greater speed.

Sunshine and Duration of Flights.

Mr. L. Roche (Chairman, Ealing and District Aero Club) writes calling attention to the above. He says: "On Saturday, January 27th—the sun having been shining the whole morning—in the afternoon my models flew well at high altitudes (estimated 90 to 100 ft.), the flight invariably ending in a long glide. On Sunday, 28th, sky cloudy, *no sun at all*, and a slight mist, the same model, with exactly the same rubber as on the previous day, would not rise to more than about 30 ft., the speed was increased, and it was impossible to obtain a *vol plané*; in fact, the model landed with the rubber still slightly wound. On both occasions the temperature was below freezing point, and there was practically no wind. I have also noticed that my best flights have been obtained on those hot and sunny days experienced last summer."

We should much like to hear from other correspondents their experiences relative to the above.

Temperature and Rubber.

Generally speaking heat causes bodies to expand—but water is an exception—so is bismuth and so also is rubber. When Professor William Thomson was made aware of this fact he suggested that stretched rubber might *shorten* on being heated. The test was applied by Mr. Joule and the shortening found to take place. The singular experiment is fully described and illustrated in Professor Tyndall's *Heat, a mode of motion*, pp. 88-89. The amount in contraction is considerable but not actually stated.

Will some reader carry out a series of careful and accurate experiments on this matter, and also *re* the effect of temperature on rubber lubricants. The results could not fail to be both interesting and valuable. It is this kind of work that is wanted in model aeroplaning, and it is also experiments of this nature which will be the ones to endure.

Official Records.

In order to prevent any misapprehensions which might arise, it may be as well to state that although the distances are actually measured out to feet and even inches, the unit of distance is the yard, and in the actual published record no part or parts of a yard are stated.

Messrs. Mann and Grimmer, writing to us with respect to the above, state that Mr. Grimmer's machine (second duration flight) struck a cycle belonging to a bystander, and was considerably damaged in consequence, with the result that Mr. Grimmer was placed at a considerable disadvantage. We had no idea that such a thing occurred, nor was the matter reported to the observers, the

crowd made it very difficult to see what actually did happen just in the immediate vicinity.

Scale Models.

The following is part of a communication received from Mr. Ernest A. Vessey on a very important subject—the remainder will appear in next week's issue:—

"When investigating the laws of aeronautics by the aid of models it is now, thanks to Mr. W. Lanchester, a well-known rule that such models must be strictly to scale, not only as regards size, but also as regards weight; *i.e.*, for every linear scale there is a corresponding weight scale which must be rigidly adhered to, if the behaviour of the model in free flight is to resemble in any manner that of the full-sized machine it represents. Expressed in symbols if

W = the weight of the full-sized machine,

w = the weight of the model,

l_1 = a linear dimension on the full-sized machine,

l_2 = the linear dimension of the same part on the model,

$$\text{then } \frac{W}{w} = \left(\frac{l_1}{l_2}\right)^3.$$

If we put $\frac{l_2}{l_1} =$ the scale in terms of full size = L , say,

$$\text{then } \frac{w}{W} = L^3 \text{ or } w = WL^3 \dots (1).$$

Thus, if the model is to be made, say, $\frac{1}{10}$ full size, its weight, w , must equal $W(\frac{1}{10})^3 = \frac{W}{1000}$.

When applying this law in practice there does not appear to be any serious difficulty in proportioning the various members of the framework, so that their weight is in correct relation to the weight of corresponding members in the full-sized machines—all that is required is to make them strictly to scale, and of the *same material* as is to be employed in the full-sized counterparts. When dealing with the fabric covering the planes, a difficulty at once arises, thus.



Some of the gold, silver, and bronze medals won by the Bragg-Smith biplane. A fine example of what can be accomplished by a model as opposed to a flying stick.

Calling the scale of the model L times full size (L , of course, being fractional), the surface area of the model planes will be L^2 times full-size. The fabric, in common with all other integral parts of the model must, if the wing structure of the full-sized machine is rigidly followed in every detail, be L^3 times full-sized weight, and therefore the weight of the fabric per unit surface will require to be $\frac{L^3}{L^2} = L$ times full size. In other words, the scale of weight per unit surface of the fabric is the same as the linear scale. Now fabric as used on full-sized machines may be taken to weigh 5 ozs. per sq. yd., and the lightest available fabric known to me, viz., gold-beater's skin, $\frac{5}{8}$ oz. per sq. yd. It therefore follows that if the model is to be a true reproduction of the full-sized machine in every detail, the smallest scale to which it can be built is $\frac{5}{8} \div 5 = \frac{1}{8}$ full size."

We are afraid Mr. Vessey has somewhat underestimated the weight of gold-beater's skin, the best quality of which weighs at least (single skin) $\frac{1}{10}$ of an oz. per sq. ft.; this allows, of course, nothing for joining, the largest pieces in which it can be obtained being about 14 ins. by 24 ins., this would make, say, 10 per cent. increase; even omitting this we obtain not $\frac{1}{8}$ but $\frac{1}{10}$ approx, say, $\frac{1}{10}$, or allowing for joins $\frac{1}{8}$.

Replies in Brief.

H. C. DAVIS.—Your apparatus resembles in some respects one used by the late Professor Langley. His consisted of a large pendulum resting on knife edges, but which was prolonged beyond the point of support, and counterbalanced so as to present a condition of indifferent equilibrium. Near the lower end of this pendulum the model was suspended, which when power was applied to it, the reaction of the propeller or propellers lifted the pendulum through a certain angle. If the line of thrust passes through the centre of gravity, it follows that the sine of this angle will be the fraction of the weight lifted—and thus the dead lift-power or forward thrust of the propellers (due to the motor) becomes known. The scale requires to be carefully graduated. Yes, we are inclined to think the large aspect-ratio the more efficient—but the problem becomes complicated, owing to the effect of compound increasing pitch, &c.; much depends on the general design.

THE KITE AND MODEL AEROPLANE ASSOCIATION. OFFICIAL NOTICES.

International Model Meeting.—Lord Montagu of Beaulieu has kindly offered the Council a trophy, which will be called *The Car Trophy*, and the hon. sec. has accepted same on their behalf, at the same time thanking his lordship for his gift. Details, &c., will be published as soon as possible, but the Council still require some donations, and four more trophies. Will wealthy readers, who have the development of aeronautics at heart, rally round and help the cause by giving the support needed.

Aerial Kite Signalling (Morse Code).—Anyone now wishing to obtain the complete outfits, approved by the association, can obtain them from Messrs. Brooke and Westhorp, 16A, British Grove, Hammersmith, or any member will be informed of the days the

F. WIEDMANN, JUN.—We do not think it possible to construct a successful petrol-engined model of 5-ft. span, but will insert your communication as a query in next issue.

E. N. JOYCE.—The idea is not new—we cannot say who first employed it—it is well known among experts as the one thing which has to be most carefully attended to when trying to make a model fly straight. It is also most efficacious (as you have found out) when desiring to make a model circle. Try the small fin in front, and let us know if the model still dives.

LAWRENCE MINOT.—From the drawing you send we should naturally expect the frame to buckle; it is insufficiently stayed. Change it to the usual triangular type, and use king-posts and cross-stay it; or try a \perp frame, it is quite probable you might be more successful with this type. Your framework *must be rigid* (it is absolutely essential) to torsion and twisting forces as well as to direct pulls.

F. H. H.—Of one screw only—since both are working simultaneously.

C. C. HORNER.—The photo sent illustrates in principle the same idea as was patented years ago by Mr. G. P. B. Smith—but being triangular instead of curvilinear is inferior to it with respect to lateral stability.

C. A. BURKITT.—The photos you send are far too small to show the details mentioned in your note, and in a case like this photos are unsuitable. If you care to send along a proper set of scale drawings we shall be pleased to consider them.

W. G. BLOE; T. H. BULLOCK.—To solder ribs to edge of piano-wire wing-frame is quite easy if the ends of the ribs ($\frac{1}{4}$ " are turned round at right angles so as to lie along the wire frame and bound with *very fine* copper wire (as used in some electrometers), and then neatly soldered.

R. BAGLEY.—For stability your two planes must form a V, opening skywards. Try a rather larger tail, fitted at rear with two *small*, adjustable, horizontal rudders. We should say you might safely give another 50 to 100 turns, if well lubricated. Use valve-tubing on your hooks.

association's honorary instructors will instruct the Territorials in the use of this system on Wimbledon Common, if he will write to the hon. sec.

Competitions.—The Chairman of the Aeronautical Research Society (East London College), has asked the association to co-operate with them and hold a competition at their annual garden party; this the Council has agreed to do. Also the Application of the Council to hold a series of Laboratory competitions in the autumn has been favourably received by the authorities of the College, and it is hoped to be able to hold some interesting scientific competitions, and to collect some useful data.

W. H. AKEHURST, Hon. Sec.

PROGRESS OF FLIGHT ABOUT THE COUNTRY.

NOTE.—Addresses, temporary or permanent, follow in each case the names of the clubs, where communications of our readers can be addressed direct to the Secretary. We would ask Club Secretaries in future to see that the notes regarding their Clubs reach the Editor of FLIGHT, 44, St. Martin's Lane, London, W.C., by first post Tuesday at latest.

MODEL CLUBS.

Aberdeen Aero Club (Sec., A. SEFTON, 387, HOLBURN STREET, ABERDEEN).

ON Saturday Mr. L. Gray's model continued its excellent performance of last week and brought the distance record up to 1,200 ft. Mr. Wilson obtained a record duration flight of 47 secs. Mr. Wilson, junr., had some excellent flights with a tandem monoplane. Mr. G. Geddes, a young enthusiastic member, repeatedly obtained 35 and 37 secs. duration. Meeting to-day, Saturday, at 3 p.m.

Aero-Models Assoc. (N. Branch) (Sec., MALCOLM B. ROSS 15, HIGHGATE AVENUE, N.).

ON Saturday last, at club's Finchley ground, Mr. Hindsley brought up three models and Messrs. Root and Partridge a monoplane each. Mr. Corder's old-type "Argencie" monoplane on one occasion got up to over 150 ft. and *vol planed* down at a fine angle.

Members and all interested are asked to turn up in force for a "Duration" competition (Saturday), at Viver's Farm, Bishop's Avenue, East Finchley, at 3 p.m. Fee 3d., shared for prizes.

"Distance" competition for "Mann" monoplane set of parts presented by the makers. March 16th, 3 p.m. Competition open, no entrance fee.

Birmingham Model Aero Club (Secs., R. COBHAM, G. H. WOOD, 8, FREDERICK ROAD, EDGBASTON).

LAST Saturday the longest flight was 48 secs., by Mr. E. Trykle. Mr. G. Wilde's Trykle-type model made fine flights, ending generally in a glide from about 30 ft.; longest duration, 44 secs.; Mr. W. Lunn's model reached a height of quite 100 ft. Mr. G. Baker, with a 5 ft.-model, and Mr. G. Mason, with his old twin-screw model, were also flying.

To-day (Saturday) duration competition for the W.H.C. model, amongst juniors.

Usual monthly meeting at Bell Inn, Phillips Street, March 4th, 8 p.m. Club business, lectures and discussions will take place.

Blackheath Aero Club (Hon. Sec., A. E. WOOLLARD, 48, HAFTON ROAD, CATFORD, S.E.).

ON Saturday general meeting was held at the Central Hall, Peckham, Mr. H. H. Groves in the chair.

The officers elected to serve for the ensuing year were:—President, Mr. C. E. Rippon; Vice-President, Mr. B. Woollard; Committee, Messrs. A. B. Clark, H. Coomber, J. H. Dollittle, H. H. Groves and F. Plummer; Hon. Sec., Mr. A. E. Woollard.

The following club records were passed:—Distance (hand-launched), 2,265 ft.; duration, 61 secs.; and distance (self-rising models), 762 ft. All these records are at present held by Mr. A. B. Clark.

Vote of thanks to Messrs. Weston, Hurlin and Co. was carried unanimously for gift of a W.H.C. model as prize for a Junior's duration contest. Details next week.

At Kidbrooke, Blackheath, Mr. G. Brown made some splendid flights with his single-screw tractor monoplane, and Messrs. Holland, Jarvis, Clark, Pizey, Egelstaff and F. G. Peter were flying their usual types of models.

At Lee, Mr. F. M. Bailey's Antoinette was again flying well, and Mr. A. B. Clark's 2½-cz. Victor tried to circle the aerodrome. Mr. F. G. Peter's small monoplane was climbing well and flew good distances.

On Wandsworth Common Mr. W. Williams' high-flying model executed a spiral *vol plané* lasting 23 seconds. Mr. L. H. Slatter's "rising-from-ground" model, with increased span, showed improved lateral stability. "Get-offs" were fine, after which model flew about 250 yards in 30 seconds.

"Point-to-point" competition at Kidbrooke on March 9th, at 3 p.m.

Brighton and District Model Ae.C. (Hon. Sec. A. VON WICHMANN, "KINGSLEIGH," KINGSWAY, HOVE.)

ON the 24th, at Shoreham, Messrs. Wichmann, Orford, and Burghope were getting up to 300 yards. Mr. Frost and other members flying, but damp air seemed to keep most models down. Mr. Burghope's 23-oz. machine put up a horrible performance. Drove her nose vertically four inches into turf; very little damage.

Shoreham Aerodrome is generally almost free from *remous* and so-called "holes," but on Saturday, 24th, there seemed to be no air at all in some places. Mr. Wichmann's six-months' old machine was seen to drop suddenly about 20 ft., and on landing, rubber was gone.

Bristol Model Flying (Sec., R. V. TIVY, 3, ROYAL YORK CRESCENT, CLIFTON).

NEXT district meeting to-day, March 2nd, at Sea Walls, at 3 p.m. Self-rising models particularly invited.

Coventry Aeroplane Building Society (Sec., J. W. SCHOFIELD, 22, KINGSTON ROAD, EARLSDON).

EXHIBITION of models and apparatus, petrol-driven models, scale models, and parts of full-sized machines, in Corn Exchange, March 30th. To be opened at 3 p.m. by the Mayor of Coventry (Col. W. V. Wyley); an address to be given by Rear-Admiral R. H. S. Bacon, C.V.O., D.S.O. Prizes for scale and other models will be presented by the Mayor. Mr. W. A. Weaver, the President, offers prize value 10s. for best model shown by an amateur (not a member of the Society); also, three certificates will be given next in order of merit. The co-operation of other clubs is invited, and amateurs for loan of models, &c. Tickets to exhibition 3d. each. Designs for full-sized glider will be exhibited by Mr. H. P. Folland. Funds are required to commence construction of this glider, and to obtain larger workshop.

Dover and District Model Ae.C. (Sec., H. D. DAVIS, "OAKVILLE," GODWYNE ROAD, DOVER.)

It is suggested that the club should hold some competitions in a few weeks time; models to complete a given triangular course in smallest number of flights. Entrance fee 2d., the winner receiving

total amount. Mr. Davis has offered a prize for the model exhibiting the best duration, stability, and control qualities, and Mr. Holman has offered a prize for the first official ¼-mile flight. Full particulars later.

Ealing and District Model Ae.C. (Sec., B. J. KIRCHNER, 1, QUEEN'S GARDENS, EALING, W.)

AT a meeting on February 21st, the secretary read proposals with regard to (1) club library; (2) gliding; (3) lectures; and (4) competition; all of which will receive the consideration of the committee. The committee are arranging, in regard to a proposal by the Paddington Aero Club, for an inter-club contest for duration, each club sending a team and an average being taken. Contests with other clubs are in preparation. Mr. L. Roche, who was in the chair, proposed that members should read papers on subjects connected with aeronautics.

On Saturday a competition for juniors, with model of their own construction, for a wrist watch was held. The winner was the one who covered a point-to-point course of 200 yards in the least number of flights, landing within 10 yards of the post. R. Grierson was winner with six flights and G. Beeching second with seven. Mr. L. Roche broke the club's record for duration, held by himself, by flying for 45 secs. In one flight his model got up to a height of at least 150 ft., and finished with a *vol plané* from that height lasting eight seconds. At to-day's (Saturday) meet, a group photograph may be taken. Members' models will be watched on Saturday to find out the best ones for duration, with regard to contest with Paddington Aero Club.

Hackney and District Aero Club. (Sec., B. H. LONGSTAFFE, 47, JENNER ROAD, STOKE NEWINGTON, N.)

AT model meeting on Saturday, good flying by Messrs. Gittus, Marmin, Potts, and P. Hurlin. Illuminated flights at close.

Manchester Model Ae.C. (40, BIGNOR STREET, CHEETHAM).

MEETING will be held at the Trafford Park Aerodrome (near the golf links) to-day, Saturday, at 3 p.m.

Paddington and Districts Ae.C. (Sec., W. EVANS, 133, BUCHANAN GARDENS, HARLESSEN).

THE first of the series of workshop models competitions was decided at the club's private flying ground at Parkside last Saturday. Mr. Woolley was first with 88 marks total with 235 yards flight. Mr. Cannell, second, 74 marks with 116 yards. M. Canning obtained 65 marks, T. Carter 44, Rasmusson 42, and Jackson (non-competitor in flying) 19.

An inter-club duration contest has been arranged with the Ealing and District Aero Club for April 6th. Six representatives of each club to compete.

Distance and duration competitions for juniors arranged for March 23rd. Prizes: 5s., 2s. 6d., and two pairs propellers.

To-day (Saturday) Mr. M. Canning's lecture on "The Position of Planes and their Relation to Stability," at workshop, 7A, Windsor Place, Harrow Road, Paddington, at 8 p.m. All members and interested friends welcomed. Lectures are being arranged for every Saturday evening during winter season.



PADDINGTON AND DISTRICT AERO CLUB.—Some of the members at the First Workshop Models Competition at the Club's private flying ground, Parkside, Sudbury, on Saturday last. Our photograph is by Mr. Davies, a member.

Reigate, Redhill and District Aero Club (Sec., H. V. MAY, 4, LONDON ROAD, REIGATE).

SIX machines out at Earlswood on Saturday. Mr. Lewis with 8-oz. stream-line wing Almono obtained steady flights. Mr. R. Wilson, experimenting with new biplane, got about 200 yards with it. Mr. May, with new 4-oz. machine, obtained about 250 yards, and several flights of 200 yards with his 'bus. Sunday Mr. May's 4-oz. model did over 350 yards on very low power. Meet to-day (Saturday) at 2 o'clock at Earlswood for competition and certificate flights.

St. Mary's Model Ae.C. (Sec., H. W. A. JOHNSON, THE VICARAGE, KINGSTON, PORTSMOUTH).

SATURDAY some fine flying was seen before a drizzling rain cut meeting short. Messrs. C. Restall and Eburne were doing "quarters." Mr. Robbins made some good flights, and then his frame smashed in mid-air. He obtained some more wood, built another one on the ground, and went on flying well. Mr. Harper, Mr. Webb, and others flying.

Next business meeting, March 13th, at 8.30 p.m.

Scottish Ae.S. Model Aero Club (6, McLELLAN STREET, GOVAN).

ON Thursday evening last week members, by kindness of the Scottish Aeronautical Society, attended Mr. Carl Bonn's lecture on "Petrol engines and propellers." The address, though at times very technical, was exceedingly bright and instructive. Mr. Bonn has very kindly offered to lecture to the members of the model section, and the subject and date will be announced later.

Next lecture will be given in the Institute, Elmbank Crescent, on March 8th, when Mr. P. S. McDuff will speak on "The action of air in relation to rotating planes."

At Ibrox, on Saturday last, good flying by Messrs. Balden, Langlands, Arthur, Graham Boyd, and Gordon. Mr. Gordon had his hydro-aero No. 2 out, but the trials were not successful. A greater speed on the water was noticed, however.

Next competition for the aggregate prize at Barrhead Aerodrome, by permission of Scottish Aviation Co., on March 16th.

Model flying, also some kite flying, at Ibrox, to-day (Saturday).

Worcester Model Aero Club (Sec., S. A. SEARS, VICTORIA INSTITUTE, WORCESTER).

ON Pitchcroft, last Saturday, Mr. F. Smith's two twin propeller machines both attained high altitudes. Mr. P. Colton's model appeared under powered, Mr. Melhuish's model was fast, though somewhat unstable.

Monthly competition to-day (Saturday), on the club flying ground, 3 o'clock. Note.—The efficiency competition counts double the marks of any other event.

Yorkshire Ae.C. (Model Section) (5A, HULLAND ST., LEEDS).

ON Saturday, on Woodhouse Moor, Mr. J. Whitaker, flying a 3-ft. monoplane, was the "star" of the afternoon, doing between 350 and 400 yards several times. Good flights by clubs oldest member, Mr. J. Holmes.

Meet at Carlton Hill to-day (Saturday).

SCHOOL AERO CLUBS.

Holloway County Secondary School Aero-Models Club (38, GLADSMUIR ROAD, WHITEHALL PARK, N.).

ON February 19th, the first of a series of lectures was delivered by the hon. sec., the subject being the "Basic Principles of Flight." Next meeting Monday, March 4th.

Southgate County School Ae.C. (84, BOWES RD., PALMER'S GREEN.)

DISTANCE competition, arranged for March 2nd, was held on February 26th, the half-term holiday. E. R. Marsh and J. Ellinghams tied for first place with 706 ft. Mr. Paull, the club president, brought up a "Mann" model, and good flights were made by Bartlett, Petty, Redottée, and Reed. On February 19th, E. R. Brown's 2½-oz. model made a flight of 92 secs., a new club record.

CORRESPONDENCE

*. The name and address of the writer (not necessarily for publication) MUST in all cases accompany letters intended for insertion, or containing queries.

Correspondents communicating with regard to letters which have appeared in FLIGHT, would much facilitate ready reference by quoting the number of each letter.

The Aeroplane in War.

[1500] I am glad Mr. Hambling has stated plainly what his ideas are. As regards his suggested expanding bullet—

(i) It must be strong enough to withstand the shock of discharge which tends to set everything inside a projectile violently back.

(ii) It must be provided with an envelope sufficiently stout to take the spin of the rifling without stripping, and to hold it together in flight.

(iii) The springs inside must be strong enough to burst this envelope instantaneously on impact. I know of nothing except a high explosive with a detonating fuze which will do this.

(iv) The sectional density must be as high as with a lead bullet, or the projectile will not keep a high velocity, and so will not have much chance of hitting a very fast moving target. The specific gravities of steel and lead are as 7 to 11, if I remember rightly, so his projectile must be longer in this proportion. This means a quicker spin of rifling to keep it steady in flight, and in consequence increased strength in the envelope, which will add largely to other difficulties.

(v) Expanding bullets of this size are forbidden by the Geneva Convention, so even if the suggested projectile could be made efficient it would not be possible to use it.

Supposing the point of opening of his bullet to be 2" = ½' from the point, and the striking velocity to be 1,000 ft. secs. This would mean that the springs must open the envelope in 1/1000" or the bullet will perforate the canvas or wood that it strikes without opening.

Does any practical man consider that a small spring at rest could be released so as to open against a certain resistance in one six-thousandth of a second?

It is, of course, possible, and even probable, that at some future time a gun of the "Pom-pom" order firing a high explosive shell of 1½ lbs. or 2 lbs. may come in for the armament of aeroplanes, but the machine gun seems the only thing at present.

R. A. (Retired).

[This correspondence is now closed.—ED.]

Soaring Flight.

[1501] Re "Soaring Flight and Kite-flyers," in your issue of February 17th, I may say that I have made and flown kites of almost every shape and size, with the exception of man-lifters, my

biggest having a total area of 21 square ft., and the smallest about ½ square ft. I have had soaring take place times out of number with a particular type of kite—a modified Brookite, to be precise—chiefly on very fine days, and in light breezes in the neighbourhood of 10 to 15 miles per hour. I did not take particular notice of the nature of the weather conditions at the time, as I was not particularly interested in aeronautics then, my object being to find the least area to carry a given weight at the greatest height, which I believe I successfully accomplished, at least so far as I wanted to go; the best I got was with a kite of the old pear shape, or rather well-known diamond type, with no stabilising fins or pockets whatever. Its area was 4½ square ft. and it would carry half a brick to a height of 100 ft. quite easily. Now this type of kite would never soar, or float, as I used to call it, on account of the great angle of incidence required to keep it stable, although it had a large range of pull, or "centres of pull," and was yet fairly stable, but in a gale there was only one position, and that undoubtedly was the correct one. Now that the subject seems to be of interest I intend, as soon as time permits, to carry out some experiments as regards soaring, &c., noting the weather conditions at the time, and will be pleased to let you know the results obtained. I also have a model aeroplane (biplane) of original design, which I made as far back as two years ago, the chief feature of which is to prevent side slipping, also to increase natural stability. I would be pleased, at any other time you may find convenient, to describe this machine in detail; I am now fitting it with twin propellers. Of course, the planes have warped a bit, it lying exposed to all weathers, but not that bad but what I can get some go out of it yet.

Birmingham.

H. KEMP.

English Manufacturers. Apathy and Prejudices.

[1502] I submitted a model of my new Duplex rotary valve-gear to six of the leading petrol engine makers in England, and asked them to send a representative to see the engine running, so far none of them have accepted the offer. Some spoke well of it, but said they were too busy to go into the matter at present, one said the valve would be leaky, another that it would work well on engines of small h.p. but not on those of large h.p., none of them seemed to be agreed on any special objection. The crude experimental engine, which is the first I have made, is of the revolving cylinder type (air cooled), the speed of which is just over 2,000 r.p.m. I am afraid to advance the spark fully as the cylinders are cast-iron, and may fly to pieces, but I see no reason why the speed and h.p. should not increase in proportion with a properly-designed engine,

as every moving part is rotary; in fact, it is practically a petrol turbine on the Otto cycle. There is absolutely no leakage at the valves, although they are a loose fit the lubricating oil effectively seals them, the charge is exploded at a pressure of six atmospheres, and the engine does not get excessively hot, but this I attribute to the large free valve ports. I shall be very pleased to demonstrate the engine to any interested manufacturer who does not look upon the mushroom valve engine as finality in design.

26D, Clarges Street, W.

WILLIAM COCHRANE.

Points for Discussion.

[1503] In answer to Mr. T. W. K. Clarke's interesting discussion (1490) of my letter in FLIGHT, of February 3rd. I must first of all apologise for my delay in answering same, which is due to pressure of time.

(i) "If the machine has a pronounced inverted dihedral angle to its wings, it will steer contrarily to the action of the rudder." Mr. Clarke does not actually contradict this, but says that the action depends on the relative dimensions of the rudder planes to the main planes and the leverage thereof. This is, of course, obvious, as it is possible to make the rudder sufficiently large to overcome the action, but in the ordinary proportions of the rudder and its leverage, the action takes place as I have proved by actual experiment.

In the course of these experiments, I made another rather interesting discovery, namely, that when the inverted dihedral is embodied in a wing of the Wiess or Etrich type, the lateral stability is actually enhanced if the centre of gravity is situated slightly above the centre pressure.

(ii) "A lifting tail machine has to dive in turning." I must mention here that there was a slight misprint in this letter, in which I said that the dive was "partly due" to the tail travelling diagonally, &c., instead of "due to." I should like, as Mr. Clarke suggests, to have the opinion of some pilots as to whether a lifting tail machine has to dive when turning, as I am not absolutely certain on this point, having arrived at it through experiment with models only, but it is obvious that at the commencement of the turn the tail has a greater side slip than the leading planes; the only conditions under which this would not be the case, would be if the rudder were placed over the main planes, in which case the main planes would be made to side slip towards the centre of the circular path, a state that would probably lead to trouble as the banking would be in the wrong direction. Mr. Clarke goes on to say that the loss of efficiency due to side slip should be overcome if the banking is correct; I think not, as the efficiency of a plane, travelling at a positive angle of incidence through the air, when that plane was designed to travel forwards, must be very small, unless the wing follows a shape that I arrived at some four years ago and with which I obtained considerable automatic lateral stability in models, namely: cambered from tip to centre as well as from front to rear.

(iii) The third point touched upon by Mr. Clarke, i.e., the staggering of the planes, I adhere to firmly; indeed, I have never heard anyone claim any aerodynamic efficiency for planes staggered "à la Farman," but have always understood that it was adopted rather as a saving for the landing chassis, by reason of the larger parachuting surface projected when the machine "pancakes," as I believe, most aeroplanes of this type do when landing. If there is any advantage to be gained through the stream-lines "fitting" better when the upper plane is in advance of the lower, surely this is more than overcome by the loss of aerodynamic efficiency through the interference of the down draught from the upper and leading plane, with the lower and trailing one, which is quite prevented when the lower plane is in advance of the upper as in the new Short tractor biplane.

In conclusion, I should be very grateful if you, or any of your readers, could tell me of any occasion or occasions when the wings of a biplane have collapsed in mid air, an accident that seems to be fairly prevalent in monoplanes.

Richmond.

JOHN CLIVE.

MODELS.

Model Copying.

[1504] My attention has been drawn to the Croydon and District Aero Club notes of your issue of the 17th ult., page 156. Therein is mentioned that Mr. C. Smither flew one of his models with a "Redivall-type" plane, which was very stable. I wish to inform your readers that I have no objection to members of properly constituted model clubs making models on my patented principle during 1912, providing always that "Redivall's type" be included in the reports sent to the Press, and also that they are not for sale. By "models" I mean monoplanes of a maximum length of 3 ft. 6 ins. Eccles.

WILL H. BOOTH ("REDIVALLS").

A Lecture on "Military Airships."

So successful have the lectures arranged by the Aeronautical Society this session proved that there is sure to be a good attendance at the Royal United Service Institution on Monday next, 4th inst., when Lieut. C. M. Waterlow, R.E., will deliver a lecture on "Military Airships."

NEW COMPANIES REGISTERED.

Harrow Aerodrome, Ltd., 3, London Wall Buildings, E.C.—Capital £1,000, in £1 shares.
Indian Aviation Co., Ltd., 4, Duke Street, Adelphi, W.C.—Capital £5,000, in £1 shares. Under agreement with P. Esdaile and W. Laurence.
National Aviation Co., Ltd., 3, London Wall Buildings, E.C.—Capital £1,000, in £1 shares. Objects, to promote the science and practice of and interest in aviation, aerial navigation and engineering.
Willisch Hydro-Aeroplane Co., Ltd.—Capital £100,000, in £1 shares. Under agreement with A. von Willisch, 34, Badin schestrass, Berlin.

PUBLICATIONS RECEIVED.

Annual Report of the Smithsonian Institution, 1910. Washington: Smithsonian Institution.

Catalogue.

Blériot Aeronautics, 1912. L. Blériot, Belfast Chambers, 156, Regent Street, W.

Aeronautical Patents Published.

Applied for in 1911.

Published February 29th, 1912.

210. D. PALMGREN. Aerial navigation.
3,120. J. G. HANNA. Aeroplanes.
3,331. M. F. SUETER, F. L. M. BOOTHBY, AND H. G. PATERSON. Aeroplanes.
4,477. A. WEISS. Flying machines.
7,237. R. WHITEHOUSE. Elevating of aeroplanes.
21,248. BRONISLAWSKI. Balancing devices.
24,615. A. V. ROE. Wheeled carriage for flying machines.

Applied for in 1912.

Published February 29th, 1912.

884. D. PALMGREN. Device for indicating deviation during flight.

The Index to Vol. III of FLIGHT (1911) is now ready. Price 3d. (post free 4d.) of the Publishers, 44, St. Martin's Lane, W.C.

PRINCIPAL CONTENTS.

	PAGE
Editorial Comment ...	186
Better Late Than Never ...	188
The Service Grant for Aviation ...	189
Automatic Stability. By J. C. S. ...	192
Air Eddies. By "Oiseau Bleu" ...	193
Royal Aero Club Notes ...	195
From the British Flying Grounds ...	199
The Magnetic Compass—its Construction and Use ...	202
Foreign Aviation News ...	204
Models. Conducted by V. E. Johnson, M.A. ...	205
The Kite and Model Aeroplane Association ...	205
Progress of Flight about the Country ...	205
Correspondence ...	207

FLIGHT.

44, ST. MARTIN'S LANE, LONDON, W.C.
Telegraphic address: Truditur, London. Telephone: 1828 Gerrard.

SUBSCRIPTION RATES.

FLIGHT will be forwarded, post free, to any part of the world at the following rates:—

UNITED KINGDOM.	s. d.	ABROAD.	s. d.
3 Months, Post Free ...	1 8	3 Months, Post Free ...	2 9
6 " " " ...	3 3	6 " " " ...	5 6
12 " " " ...	6 6	12 " " " ...	11 0

Cheques and Post Office Orders should be made payable to the Proprietors of FLIGHT, 44, St. Martin's Lane, W.C., and crossed London County and Westminster Bank, otherwise no responsibility will be accepted.

Should any difficulty be experienced in procuring FLIGHT from local newsvendors, intending readers can obtain each issue direct from the Publishing Office, by forwarding remittance as above.